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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. APRIL 6, 1899. CHICAGO, ILL. NUMBER 14

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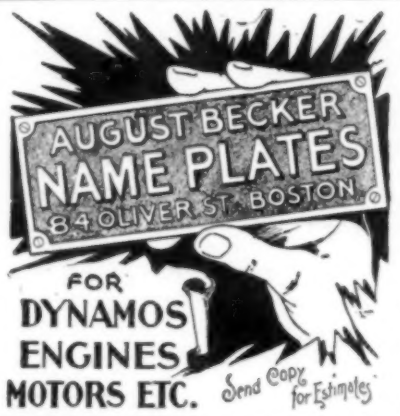

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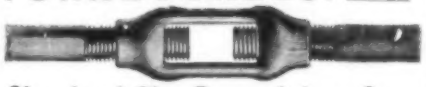

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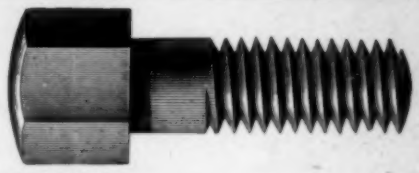

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. APRIL 6, 1899. CHICAGO, ILL. NUMBER 14

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The iron trade is not now disposed to ask how much farther prices are to advance. That query was more pertinent a month ago. Without attempting to prophesy, leaders in the trade are giving proof in one way and another that the real question is how much below to-day's prices for steel and finished products will business be done for the second half of the year? In Bessemer pig iron the basis has been established—a minimum, that may also be not far from the maximum. In foundry iron there have been contracts all the way along the upward course, and some of them at the top prices, so that to-day foundry furnaces are practically sold up into fall, and foundries are generally provided for through an equal period. Billets and sheet bars are still undetermined, and this is true of the bulk of finished material, apart from rails. Over the whole situation there is the shade of uncertainty due to the attempt on the Marquette range to coerce mining companies and non-union workers to come under union domination. While a simple wage difference might not be difficult of adjustment in times like the present, such an issue as is now raised may lead to a stubborn contest. Any interruption of the ore supply, it is evident, would upset all calculations as to prices, with such tension as has been on every line of production in the past three months. The lull in buying that may extend over the next few weeks will not beget the uneasiness that would have attended uncertainty about future supplies, under the old conditions. Interests have been so rolled together in the past six months that it is now known in advance where a large fraction of the billets and sheet bars, for example, of Central Western plants will be placed. If the sheet mill consolidation is put through, and that of the hoop and cotton-tie mills, the situation will be further simplified. At the moment the interesting news feature is the formation of the Republic Iron & Steel Co., with $25,000,000 7 per cent cumulative preferred and $30,000,000 common stock. The company has acquired 29 rolling mills west of Pittsburg, six blast furnaces and several iron mines on Lake Superior, as detailed elsewhere. The prospectus estimates profits of $3,500,000 on the combined properties. An important question relates to the steel billet supply of the new company, and in this connection something may develop as to the policy of the large aggregations in the iron trade—whether the building of new plant will be made necessary, or agreements entered into that will tend to prevent the overbuilding of steel capacity. For the present at least it would appear that the Republic Iron & Steel Co. will be a customer of the National Steel Co. and other concerns that have billets to sell. The wrought pipe and sheet mill consolidations are taking time, with present indications of a successful outcome. The promoters of the bridge combine are still hard at work and are sanguine of the outcome. Arrangements with structural steel manufacturers are said to be no longer an obstacle. Apart from the advance of $2 made on structural shapes there have been no changes in prices in any line the past week. Buyers of finished material are contracting only for immediate needs on the present basis, and are looking for lower prices for the second half, reasoning that billets should settle to about $21 as maximum. The volume of spring and early summer business will be a deciding element; meanwhile mills are too hard pressed for material to give any thought to the latter part of the year. One contract of importance closed the past week was for 13,000 tons of acid open-hearth plates for the East River bridge, taken by a Pittsburg mill. Chicago shows a well sustained demand for structural steel. But in general finished material has been quiet. Southern sellers of foundry iron have seen some slackening of the buying rate of preceding weeks. Foundries have made large engagements of iron in the past three months and there is less apprehension of difficulty in securing what may yet be uncovered for the second half of the year.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World*, 705 PUBLICATION BUILDING, April 6.

The iron trade is now undergoing a test which shortly will show positively the amount of strength it can muster, sellers on the one hand refraining from urging sales for the second half, and buyers refusing to take hold. Sellers profess to be certain that the present range will be maintained, and at any rate do not want to urge sales if doing so would tend to depress prices. The future of the trade for this year cannot be forecast until the present period of inactivity is ended. The sales of pig iron so far have only shown that there is good reason to believe that the present level will be maintained; they have not proved that they will nor have they been of sufficient volume to make this necessary. There is admittedly a wide range between pig iron and steel, and opinion is divided as to which is likely to move. While the spread is likewise great between ore and pig iron, there can be no change in ore because that trade is settled for the year both as to price and volume. Selling in this market during the week under review has been of limited volume, and only to a small extent beyond July 1. Very little pig iron has been sold for either prompt or future delivery, and practically no steel in the open market except for quick shipment, the transactions involving but small volume. Prices in these crude materials are unchanged from a week ago, and there is less tension. In more finished lines there have been some advances, following rather in the wake of the recent advances in raw material, than prompted by any sudden increase in the demand.

Strong views are held by many leaders in the iron trade that the iron and steel business will if anything reach a still higher stage of prosperity during the balance of this year. The strong position of the farming community is pointed out, that they are well provided with ready money, are realizing to a greater extent than usual the value of their last year's crops, and are spending money freely. The foreign markets are very strong, and in all lines of business is on the in-

crease, the lead of the iron and steel trade being promptly followed in other lines. The export business in iron and steel has not been affected to the extent that would be imagined, by the present high prices. It is true that in pig iron and billets exports have received a temporary check, but in more finished lines the export trade is being maintained, largely by the greatly increased firmness of the foreign markets, and to a lesser extent by concessions made by the American producers. The foreign manufacturers of cold rolled shafting, for example, advanced their price by $5 a ton during the month of March, and by fully $10 a ton since the present movement began. Foreign producers in nearly all lines are well loaded for months to come with orders, and this country is of necessity called upon, even at prices which a few months ago would have been considered prohibitory. As an example, it may be cited that a concern in this district took within the last few days an order for 300 tons of steel bars from a British consumer at 1.60c.

PIG IRON.—There has been little movement in pig iron. The valley furnaces have no open quotation on Bessemer for the second half, but have so far sold not over 150,000 tons at $14.50, and are not pressing sales. For delivery this side of July 1 they have very little iron. Pittsburg furnaces appear to expect higher prices, and some are quoting a prohibitive price in view of the valley situation; but Pittsburg iron can be had at $15, furnace, making a price delivered to a Pittsburg mill the same as valley iron. In foundry iron the situation is somewhat relieved from the tension in the past two or three weeks, caused largely by a pressure on the part of consumers for iron they did not absolutely need, but prices are not quotably lower, and there have been sales realizing figures higher than those given below, because of special conditions. In gray forge the market is quiet, with the market held at from $14.25 to $14.50, Pittsburg, and about 25 cents lower in the valleys. We quote as follows:

Bessemer, valley furnace	$14.50
Bessemer, Pittsburg	15.00 to 15.25
No. 1 Foundry	15.75 to 16.00
No. 2 Foundry	15.50 to 15.75
No. 3 Foundry	15.00 to 15.50
Gray Forge, valley furnace	14.00 to 14.50
Gray Forge, Pittsburg	14.25 to 14.50

STEEL.—There has been no selling in the open market for the second half, and the limited demand for quick shipment is being provided for readily at prices last quoted, $25.50 to $26. Buyers are not anxious to talk business for the second half, and producers profess to be indifferent as to the date on which the business is placed, while claiming there is no question as to about the range of prices which will be paid. Open-hearth steel is very scarce yet, and the market is unquotable. There is no open market on sheet bars or wire rods.

FERRO-MANGANESE.—This line is very strong, and the agreed price of $70 is well maintained, with higher prices quoted to less than carload buyers.

STRUCTURAL MATERIAL.—The manufacturers have advanced prices $2 a ton on all shapes. The demand is rapidly increasing, and mills are even now finding it somewhat difficult to keep up shipments, while there is every prospect of considerable difficulty during the summer. We now quote: Beams and channels, 3 to 15 inches, 1.50c; 18 to 24 inches, 1.60c; tees, 1.55c; zees, 1.50c; and angles, 1.50c to 1.55c; universal mill plate, 2c.

RAILS AND TRACK MATERIAL.—The rail market is without interesting features, the price recently agreed upon, $25, being below the billet basis, and manufacturers in some cases quoting above $25, the figure established for both light and heavy sections. In track material some producers are quoting very much higher prices, and the market is fully $2 a ton higher, on an average, than at last report. We now quote: Spikes, 1.80c to 1.90c; track bolts, 2.20c to 2.40c; splice bars, 1.50c to 1.70c; links and pins, 1.80c to 1.90c.

BARS.—The bar market is gaining strength steadily, and nothing below 1.60c can be done on steel bars, while as high as 1.70c is quoted, while iron bars are all of 1½c. In iron bars the new card is being used by both Eastern and Western mills, and there are but two cards, that for steel bars and that for iron bars.

PLATES.—The plate market continues very firm. A local firm last week booked orders for a tonnage aggregating 15,000 tons, averaging about 2c, a small part of which will be delivered within the next two or three months, the bulk of the deliveries, however, being for the third and fourth quarter. Very little material can be had before the middle of the year, and prices are unchanged as follows: Tank plate, 2c; shell, 2.05c; flange, 2.10c; fire box, 2½c to 3½c.

SHEETS.—There is scarcely any sheet market, as with the sold up condition of the sheet mills generally, and the impossibility of getting all the raw material desired, there is no chance to book orders of any consequence for shipment before July 1, and beyond that time mills will not quote, doubtless because of the impending consolidation, which is making slow progress, although little doubt is expressed as to the final outcome. We quote No. 28 nominal at 2.50c, with dealers quoting much higher prices for prompt shipment. Galvanized sheets are scarce and higher, about the best quotation being 70 and 10 off, with an 18-cent frieght allowance.

PIPES AND TUBES.—While satisfactory progress is being made in the consolidation movement, it will be several weeks yet before the details are completed and the subscription books opened. As has been stated, about all the options are now in. There has been no change in discounts, while the market is firm and active. We quote: Merchant pipe, base discount 60 per cent and additional discounts five 10's for less than carloads and five 10's and 5 for carloads, with free delivery on the latter within the prescribed territory; lap weld casing, 52½ and 10 for screw and socket joint and 52½ for inserted joint, with 5 per cent additional on carload orders; boiler tubes, 1¼ to 1½-inch, 45 per cent; 1¾ to 2½-inch 55 for iron and 60 for steel; 2¾ to 6-inch, 60 for iron and 62½ for steel, all with an extra 5 per cent to dealers.

SPELTER.—The spelter market has varied but little since last report, and is now but a trifle higher. There is every reason to believe that the high price of ore, together with the active and continued demand, will keep this metal above 6 cents, at Pittsburg, for a long time. We quote, New York, 6.35c, Pittsburg, 6.25c to 6.30c, and St. Louis, 6.20c.

OLD MATERIAL.—The scrap market is about as last reported as regards figures, but there is more pressure on the part of dealers to sell, the mills being pretty well provided up to July 1, except in melting stock, for which there is a continued and active demand. We continue to quote: New melting stock, $14.50 to $14.75; old steel rails, long lengths, $12.50 to $13; cut, $13 to $13.50; old iron rails, $17 to $18; wrought iron scrap, $15 to $16, valley; cast borings, $8, net, Pittsburg; busheling scrap, $11 to $11.50, net; car wheels (nominal), $14 to $14.50, gross; cast scrap, $12, gross; charcoal scrap, $13, gross; wrought turnings, $8 to $8.50, net, Pittsburg.

COKE.—The coke market has been unusually active, sales of furnace coke being made to furnaces which the present high prices will bring into blast as soon as arrangements can be made, and the price is well maintained of $1.75 for strictly Connellsville furnace coke, and $2.15 for crushed and foundry coke to dealers and $2.30 to consumers. There has been a heavy pressure for shipments, which have been very large, and promise to be still larger. The H. C. Frick Coke Co., during the 27 business days of March, having shipped 32,405 cars, aggregating 650,000 tons. This is by far the company's highest record, the best previous month having been December, 1895, when the shipments were a shade under 30,900 cars; but there is every probability that the March record will be exceeded in the coming months.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, April 5.

Business has been quite active in several lines of iron and steel, while others have been rather more quiet than has been the case of late weeks. There is a large demand for material and sales are limited, in most cases, only because the makers are not prepared to meet required deliveries or do not care to sell for a long time ahead. Such dealers or producers as have any material that can be sold for anything like immediate delivery not only can dispose of it at any time, but can get almost any price asked for it.

PIG IRON.—Nearly all the dealers report a quiet market for the week. One Southern agent reports sales of about 15,000 tons in the week, all of it in comparatively small lots. In fact, no large sales were made in this market last week. There is considerable demand for iron for future delivery, but as a rule furnaces prefer not to sell for a very long time ahead. There are a number of buyers, some of them large, who will

have to make purchases soon, and it is expected that as soon as they come into the market again there will be another general buying movement which will add further strength to the market. No changes have been made in prices in the week. The Spring Valley furnace, at Spring Valley, Wis., will blow in on coke iron about May 15. The Calumet furnace is expected to be ready to blow in June 1.

Lake Sup. Charcoal	$17 00 @$18 00	Southern Coke No. 3	$14 75 @ 15 00
Local Coke Fdy. No. 1	15 50 @ 15 75	Southern No. 1 Soft	15 50 @ 16 00
Local Coke Fdy. No. 2	15 00 @ 15 50	Southern No. 2 Soft	15 00 @ 15 50
Local Coke Fdy. No. 3	14 50 @ 14 75	Southern Silveries	15 50 @ 16 00
Local Scotch Fdy. No. 1	15 50 @ 15 75	Jackson Co. Silveries	17 00 @ 18 00
Local Scotch Fdy. No. 2	15 00 @ 15 50	Ohio Strong Softeners	15 50 @ 16 50
Local Scotch Fdy. No. 3	14 50 @ 14 75	Alabama Car Wheel	17 50 @ 18 00
Southern Coke No. 1	16 00 @ 16 25	Malleable Bessemer	15 50 @ 16 00
Southern Coke No. 2	15 25 @ 15 75	Coke Bessemer	15 50 @ 16 00

BARS.—There is a large demand for both iron and steel bars and considerable sales were made last week. The iron mills are not anxious to make large sales, preferring to wait until the bar iron consolidation is put through. This has had the effect of limiting the tonnage of orders. Iron bars are quoted at 1.55c to 1.65c; steel bars, 1.60c to 1.70c, both from mill. Prices from store are 10c to 25c higher. The consolidation of bar mills is expected to go through within a short time now, as all of the active mills in Western territory have agreed to the preliminaries. It is said the company will have a capital stock of $55,000,000, of which $30,000,000 will be common and the rest preferred stock. The mill of the old Calumet Iron & Steel Co. at South Chicago, which plant was recently purchased by the South Chicago Furnace Co., will be operated as an independent mill. This plant will be put in operation within sixty days, probably on steel from billets.

STRUCTURAL MATERIAL.—The sales of the week include 1,200 tons for track elevation for the Belt Railway and 900 tons for track elevation for the Pennsylvania, besides several other orders for bridge material from railroad systems. Other business was in small lots, although the aggregate was good and the market was very active. The Schlesinger & Mayer building, mentioned some time ago as let, came up again last week and was refigured. A warehouse taking about 1,500 tons and a building for the Sheldon estate to replace one recently destroyed by fire, and to utilize a considerable tonnage, are among contracts to be placed soon. Prices have been advanced again $2 a ton. Quotations are as follows: Beams, 15 inches and under, 1.65c to 1.70c; 18 inches and over, 1.75c to 1.80c; angles, under 3 inches and over 6 inches, 1.75c to 1.80c; 3 inches to 6 inches, 1.65c to 1.70c. Sheared plates, 2.25c to 2.30c; universal plates, 2.25c to 2.30c; tees, 1.70c to 1.75c; zees, 1.65c to 1.70c. Small lots from stock are quoted at ¼c to ½c higher.

BILLETS AND RODS.—There have been no sales of either billets or rods in this market. Prices are nominally as follows: Bessemer billets, $25.50 to $26.50; open-hearth billets, $28; rods, $32.50.

PLATES.—There is a large demand for plates, and considerable orders have been given to the local stores. Mills are not in position to accept business for anything like short deliveries. Prices are higher again, as follows: Tank plates, 2.25c to 2.30c; flange steel, 2.35c to 2.45c; marine steel, 2.45c to 2.55c; fire box steel, 3c and upwards.

SHEETS.—The mills are nearly all practically out of the market, and very little tonnage could be obtained for mill shipment. Mills are asking 2.75c to 2.80c for No. 27 common for what they are selling. Galvanized sheets are in large demand, but little can be obtained from the mills, who are selling at 70 and 7½ to 70 and 10 off.

RAILS AND TRACK SUPPLIES.—Sales of 14,000 tons of rails were made last week by the local mills. Prices are higher by $1 a ton. There is a good demand for both standard and light sections. We quote: Standard section rails, $25 to $26; light rails, $25 and upwards; steel splice bars, 1.40c to 1.50c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

MERCHANT STEEL.—Most of the business done last week was in small lots, although several good sized contracts were placed. The demand is good, and is likely to continue so. Quotations are as follows: Open-hearth spring, tire and machinery steel, 2.30c to 2.35c; smooth finished machinery steel, 2.35c to 2.45c; smooth finished tire steel, 2.15c to 2.25c; tool steel, 6c to 7.50c; specials, 10c and upwards.

SCRAP.—There is a large demand for foundry grades of scrap and not enough can be secured to satisfy the wants of consumers. Mills are not large buyers at present, as deals have been postponed until after the bar mill consolidation has been put through. Prices on some grades are higher. Dealers' selling prices are as follows:

Old iron rails, gross	$17 00@$18 00	Axles, net	$17 00@$17 50
Old steel rails, long, gr.	11 75@ 12 00	Cast borings, net	6 00@ 6 50
Old steel rails, short	11 00@ 11 50	Wrought turnings, net	7 25@ 7 75
Old wheels, gross	16 50@ 17 00	Axle turnings, net	9 50@ 10 00
Railroad forge, net	15 00@ 15 50	Mixed steel, gross	8 00@ 8 50
Dealer's forge, net	11 50@ 12 00	Stove plates, net	8 00@ 8 50
No. 1 mill, net	9 50@ 10 00	Heavy melting steel, gr.	11 00@11 50
Heavy cast, net	13 00@ 13 25	Old iron splice b., net	16 00@16 25
Malleable cast, net	8 50@ 9 50		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World*, 27 VINCENT ST., April 5.

The various negotiations for Lake Superior mines are still a feature of interest in the ore trade. As all mines are well sold up for 1899, properties likely to change hands will not be available as sources of supply for the new owners until 1900. Under these conditions some of the options now held may not be closed for some little time. Important properties are named in current report concerning some of the large companies. American Steel & Wire, National Steel and Republic Iron & Steel Co. are all interested in negotiations that are more or less advanced. Though the demand for a general advance, made by the miners at Ishpeming, a few weeks ago, was not pressed to the point of a strike at the time, agitation has been going on, and in the past week the union called its members out, and at once the tactics of 1895 were begun—parades to the various mines in an effort to compel all non-union men to quit work. This has been only partly successful and measures have been taken by the companies to protect their men who want to continue at work. It would seem that the men would be slow to repeat the folly of 1895, particularly in view of the favorable comparison that can be made of Ishpeming wages with those of other Lake Superior districts; but the possibilities of interruption in ore shipments, due to the present trouble are not to be overlooked. The attempt to compel a complete unionizing of the labor at Ishpeming will not succeed, but it may be costly on both sides, if the present attitude of the agitators is maintained and the men consent to follow them. The lake transportation side of the ore business is of interest at this juncture. All signs point to a later opening than usual and meantime vessel men's ideas as to freights on uncovered ore are very bullish. Between a shortened season and labor contingences, the year presents some uncertainties at the outset that may have far-reaching effect on the iron trade. A meeting of Lake Erie dock managers in Cleveland on Tuesday advanced the charge for unloading ore from 14 to 16 cents.

PIG IRON.—Nothing has been done in Bessemer iron in the past week, and while it is known that there are steel works requirements yet to be provided for—comparatively small amounts for the second quarter and round lots for the second half—there is a lull. Meantime, no price exists, as each transaction is taken up by itself and no quotations are out. Nominally the market is $14.50 valley furnace, the basis of the last sales. Foundry iron is still quoted at $14.50 valley furnace for No. 2. Some iron has been sold in the week by a furnace about to start up, at $14.25, and this price is an advance over recent sales of the same iron. There are signs of a lull in buying, many foundries being quite well covered into the fall, though others are still in the market from time to time for iron in excess of their estimates of consumption. There is not the same disposition noticeable a short time ago, to contract in advance of the usual time. It is more apparent that there will be iron enough to go around; and with furnaces now booked well ahead and foundrymen fairly provided for, no large buying movement is to be expected in the immediate future, though there is likely to be a steady run of business in moderate lots.

Bessemer	$15 15	Valley Scotch No. 1	$15 90@16 15
No. 1 Strong Foundry	15 65@16 15	Valley Scotch No. 2	15 40@15 65
No. 2 Strong Foundry	15 15@15 65	Gray Forge, valley	14 00@14 50
No. 3 Foundry	14 75@15 00	Lake Superior Charcoal	16 00@16 50

FINISHED MATERIAL.—There has been no change in prices in the week, apart from the advance in structural material which brings beams and channels and angles to 1.50c Pittsburg, small angles and wide beams carrying from $1 to $2 a ton higher. Bridge work has called for some additional tonnage that has come to this market; otherwise buying has

been limited. In nearly all finished lines the bulk of the week's business has been in specifications on contracts. Sheets are quoted 2.70c to 2.80c Cleveland for No. 27. Mills are not entertaining new business to any extent, and as in other finished lines there is no definite idea as to the basis for third quarter business. We continue to quote bar iron at 1.50c Cleveland and valley mill, but business now is chiefly from jobbers' stocks, pending consolidation arrangements. Steel bars are quoted all the way from 1.50c to 1.75c Pittsburg, the latter price being from mills that cannot take new business for several months.

OLD MATERIAL.—The activity just now is greatest in foundry scrap. The mills are only taking what will satisfy immediate requirements, anticipating that the new regime will bring a substantial easing in prices of old material. Some grades of foundry scrap are scarce and dealers are getting their prices. We quote: Old iron rails $18 to $19, valley mill; old steel rails, $13 to $14; old car wheels, $16, Cleveland; No. 1 railroad wrought scrap, $16, valley; busheling scrap, $12; machinery cast scrap, $12; wrought turnings, $9 50; cast borings, $8; old iron axles, $18.50 to $19.

CINCINNATI.

April 6.

Matthew Addy & Co. say in their current review of the pig iron market: "Many buyers during the past week came into the market, felt it, and then concluded not to purchase just now, stating they believed they could buy at lower prices later on. It is hard to see on what they base their hopes. It is true that there has been some little warrant iron offered at prices slightly below those which are being asked by the Southern furnaces, but these lots amount to very little and are scarcely worth taking into consideration. Iron is scarce and the visible supply is rapidly being contracted for. It is impossible for the new furnaces that talk of going in blast to be put in for some time to come. In spite of the attitude of the large buyers mentioned above there was a good deal of buying last week of a very satisfactory kind. Full prices have been obtained and, as has been the case now for a month, the buyers have seemed more particular in regard to having deliveries guaranteed than in regard to prices." Rogers, Brown & Co. say: "The pig iron market has been less active during the past week, and there is evidence to show that consumers who have not covered their requirements for the last half of the year, are disposed to wait awhile. This is looked upon favorably by the producers, for it gives them an opportunity to take a little breathing spell, and try and arrive at a decision as to future prices. The situation has cleared sufficiently to enable producers in the South having iron to sell to hit upon quotations very nearly alike. An Ohio buyer, who has been in the market during the past week, said that the difference in prices quoted by several different agents on Southern irons was only 5 cents per ton. A visit to the Birmingham district during the week confirmed the previous reports as to yards bare of pig iron, and order books well filled. In spite of the rather sensational reports that have been circulated in relation to the probable heavy increase of output in the near future, it is not believed that the enlargement of capacity will make any material change for several months at least. Most of the furnaces mentioned as about to blow in are of small size and raw material is not readily obtainable. The old Vanderbilt furnace is to be started on a mixture of red and brown ores, some time in June. The Warner Iron Co. is to begin operations again and will at at early date place Warner charcoal foundry iron on the market. In Lake Superior coke irons the prices are decidedly irregular. One of the Mahoning Valley stacks started out with the idea that it could keep prices down by making quotations very much less than prices named by others. They found their iron taken up so rapidly that a radical advance has now been made. It seems to be the desire to hold values about where they are, and avoid, if possible, undue excitement that may prove disastrous later." We quote for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $15.25; No. 2, $14.25 to $14.75; No. 3 $13.75 to $14.25; No. 4 and gray forge, $13 to $13.50; mottled, $13 to $13.50; No. 1 soft, $15.25; No. 2 soft, $14.25 to $14.75; Lake Superior coke, No. 1, $16.25 to $16.50; No. 2, $15.75 to $16; Hanging Rock charcoal No. 1, $17 to $18; Jackson Co. silvery No. 1, $17 to $17.50; Standard Georgia car wheel, $15.75 to $16.50; Lake Superior charcoal, $16.75 to $17.25.

PHILADELPHIA.

April 4.

"For the past 10 days the market has kept an even pace. The pressure to place orders for late deliveries has been somewhat relaxed in the past few days. Evidently more iron must be had by some consumers, for their second quarter needs, but it does not appear from what source it can come except from some of the furnaces expecting to be in operation early in April. In some cases quotations are not made on finished material because none can be furnished by the mills applied to. The pig iron situation may clear up somewhat in the next two months, when something can be judged of the capacity of furnaces now about to blow in. Buyers differ in their views; some looking for a check on the advancing tendency of prices, while others show more anxiety about getting orders booked and material insured than about price. How urgent buyers' demands are to be is an important question. There are evidences that present consumption is to keep up steadily, and in the open months of the year to be considerably exceeded. Makers of pig iron are not courting further advances; indeed are rather helping to hold prices down, and are somewhat easier in their views as to the third and fourth quarters. We quote No. 1X foundry at $16.50 to $17 No. 2X foundry, $15.75 to $16.25; No. 2 plain, $15.25 to $15.50; mill iron, $15 to $15.50. The billet market has not come any nearer in the week to its usual place relative to pig iron. There is little or no steel to be had for early delivery, but small lots have brought 2.15c to 2.25c. The conditions in finished lines indicate that the congestion will continue until the middle of the year; then there may be some relief, it is figured, from the present glut of plate and bar mills. We quote tank plates at 2.15c to 2.25c; refined bars at 1.50c to 1.60c; steel bars, 1.60c; angles, 1.65c to 1.70c; beams and channels, 1.65c, up to 15 inches wide. Within the week an advance of $2 a ton in structural steel has been made. Plate mills have been offered more business that they could not take, but a sale of 3,000 tons to a Delaware shipyard is reported. Some considerable orders for bridge plants have been taken by a Pittsburg mill. Old material has made strong advances and steel scrap has sold at $16, with $10.50 to $17 quoted. Sales of old iron rails have been made at $17.50; iron axles at $20; old steel rails, $15 to $15.50.

THE Drake & Stratton Co., of Pittsburg, has the contract for constructing the foundations for the new continuous mills of Jones & Laughlins, Ltd., South Side. The erection of this mill will finish the improvements that have been made in the last two years at a cost of several million dollars by the Jones & Laughlins interests. The two mills will be about 1,200 feet long and will be built about 22 feet above the level of the Pittsburg, McKeesport & Youghiogheny Railroad tracks. This will necessitate the erection of a retaining wall, about 2,000 feet long and 22 feet high, and slag and cinders will be filled in for the mill foundation. The wall will contain about 20,000 cubic yards of masonry.

THE Carbon Steel Co., Pittsburg, last week closed a contract to furnish 13,000 tons of plates for the new East River bridge, New York. About 60,000 tons of material will yet be required for the bridge, a large quantity of open hearth billets being yet required, for drawing into wire. These will probably be purchased direct from the manufacturers and converted into wire under contract.

THE H. C. Frick Coke Co. broke its record for shipments of coke last month, the total shipments being 32,405 cars, against the best previous month's record of a trifle under 30,900 cars, made at the culmination of the boom, in December, 1895. The March shipments aggregated 650,000 tons, and the conditions warrant the belief that each of the next few succeeding months will surpass the record just made.

THE W. Dewees Wood Co., of McKeesport, has found it difficult to secure the men needed to man the furnaces, and two of them were forced to suspend operations. Formerly the mill was run with two turns of 12 hours each. Now three eight-hour turns are worked and the output is much increased. The demand is without precedent.

Republic Iron & Steel Co.

The name chosen for the Western rolling mill consolidation is the Republic Iron & Steel Co., and articles of incorporation have been filed the past week under New Jersey laws. The capital is $55,000,000, of which $25,000,000 is 7 per cent preferred and $30,000,000 common stock. The negotiations, which have been referred to in these columns from time to time, have required an infinite amount of detail work, and have presented the most complicated problem yet encountered in the history of the concentration movement in iron and steel. It is said that the capitalization was fully and promptly subscribed by the rolling mill interests involved and by the underwriting syndicate in New York with which the proposition was originally taken up, no outside subscriptions being solicited, though there have been many applications for subscription rights.

As has been noted heretofore the companies included operate rolling mills in the district west of a north and south line through Pittsburg, and their trade is principally in the Central West and the West and South. A list of the concerns that will be finally included could not be made with entire accuracy to-day, as some decisions are pending. There will not be less than 29; probably not more than 37. The yearly capacity in finished material, chiefly bar iron and steel, is about 1,000,000 tons. The new company will also be a seller of pig iron. In addition to merchant bars its finished lines will include nuts and bolts, agricultural shapes, angles, small rails, spikes, horse-shoe iron—a variety of forms that trace back to puddling, busheling and heating furnaces. The consumers of this material are chiefly railroads, car works and agricultural implement works. So far as steel is concerned the new company has practically no source of supply of its own. There are two 30-ton open-hearth furnaces in the plant of the Birmingham Rolling Mill Co., but no other plant, either Bessemer or open-hearth. There have been various statements as to the company's intention of erecting a Bessemer steel plant on the south shore of Lake Erie, or possibly at Youngstown; but there are as yet no plans in this direction. A Bessemer steel plant means 18 months from start to finish ordinarily, and the possibilities of a mutually advantageous contract with some steel company already in existence are likely to be canvassed well before the erection of additional Bessemer capacity is undertaken. More open-hearth plant could readily be provided, and it is entirely probable additions will be made in this direction.

An important development in connection with the plans of the new company is in the securing of an ore supply. It is understood that the Franklin mine on the Mesabi range, owned by Frank Rockefeller, has been acquired, and that the Atlantic mine on the Gogebic range is also under option. Other properties expected to be taken are the Cambria and Lillie, at Negaunee, Mich. The Cambria Iron Mining Co. owns the latter and the control is in the hands of the Barnum interest, represented in the firm of Simpson, Thatcher & Barnum, 10 Wall st., attorneys who have been prominent in bringing on the Republic Iron & Steel Co. deal. Except the Lillie the mines named are Bessemer properties—an indication either that preparations are being made for the production of Bessemer steel ultimately, or that some of the new company's furnaces will run on Bessemer iron, which would be utilized as trading stock with a steel company for part of such billet supply as may be bought.

The six blast furnaces belonging to properties to be acquired by the Republic Iron & Steel Co. are the following: Haselton Furnace of the Andrews Bros. Co., Haselton, O., one stack, 76x18 feet; yearly capacity, 120,000 tons. Hannah Furnace, of the Mahoning Valley Iron Co., Youngstown, O., one stack, 75x16 feet; yearly capacity, 65,000 tons. Cherry Valley Furnace of the Cherry Valley Iron Works, Leetonia, O., one stack, 75x16 feet; yearly capacity 60,000 tons. Phoenix Furnace of the Brown-Bonnell Iron Co., Youngstown, O., one stack, 60x15 feet; yearly capacity 40,000 tons. Pioneer Furnaces of the Pioneer Mining & Mfg. Co., Thomas, Ala.; two stacks, 75x16½; yearly capacity, 95,000 tons. The Pioneer Furnace interests include also large tracts of ore and coal lands, with mines developed and coking plant. This plant was acquired to supply the Alabama mills, also the Northern plants in the consolidation that have regularly used a certain proportion of Southern forge iron in their puddling mixture. The total annual capacity of the furnaces named is 380,000 tons.

The names of the plants for which in nearly every case deals have been closed are as follows:

Mahoning Valley Iron Co., Youngstown, O.
Brown-Bonnell Iron Co., Youngstown, O.
Andrews Bros. Co., Youngstown, O.
Lake Erie Iron Co., Cleveland, O.
Toledo Rolling Mill Co., Toledo, O.
Cherry Valley Iron Works, Leetonia, O.
Atlantic Iron & Steel Co., New Castle, Pa.
Corns Iron & Steel Co., Massillon, O.
Eagle Iron & Steel Co., Ironton, O.
Central Iron & Steel Co., Brazil, Ind.
Indiana Forge & Rolling Mill Co., New Albany, Ind.
Indiana Iron Co., Muncie, Ind.
Inland Forge & Iron Co., East Chicago, Ind.
Marion Steel & Iron Co., Marion, Ind.
Muncie Iron & Steel Co., Muncie, Ind.
Terre Haute Iron & Steel Co., Terre Haute, Ind.
Wabash Iron Co., Wabash, Ind.
Union Steel Co., Alexander, Ind.
Westerman-Stewart Iron Co., Marion, Ind.
Union Rolling Mill Co., Cleveland, O.
Wetherald Rolling Mill Co., Frankton, Ind.
Springfield Iron Co., Springfield, Ill.
Sylvan Steel Co., Moline, Ill.
Pioneer Furnace Co., Birmingham, Ala.
Tudor Iron Works, East St. Louis, Mo.
The Birmingham Rolling Mill Co., Birmingham, Ala.
Mitchell, Tranter & Co., Covington, Ky.
Alabama Rolling Mill Co., Birmingham, Ala.
American Nut & Bolt Co., Newport, Ky.
Anniston Iron & Steel Co., Anniston, Ala.
Sharon Iron Co., Sharon, Pa.
Columbus Iron Co., Columbus, O.
Ohio Iron Co., Zanesville, O.
Reeves Iron Co., Canal Dover, O.
Peoria Steel & Iron Works, Peoria, Ill.
Knoxville Iron & Steel Co., Knoxville, Tenn.
Helmbacher Forge & Rolling Mill Co., St. Louis.
Kansas City Bolt & Nut Co., Kansas City, Mo.

As already intimated, some negotiations are still under way that may add to or subtract from this list. The prospectus states that 29 rolling mill plants besides ore properties and furnaces have been acquired. The plants in doubt are among the last eight or ten in the above list. Some little time may elapse before the election of directors and officers will take place. In connection with prominent offices names of Youngstown manufacturers who have been active in promoting the deal are mentioned. The headquarters will be in Chicago, it now seems certain, though some idea was entertained of Cleveland for a time.

The effect of the consolidation upon the scrap market is a question generally discussed. There is to be one buyer of old material, and his headquarters will be in Chicago. The company will deal direct with the railroads, and in large part the accumulation and sale of scrap by dealers, who often carry expensive stocks through long periods, will be done away with. There will still be buying from dealers, in certain lines of scrap, but with competitive bidding removed prices will fluctuate but little and will be at a generally lower level than has obtained under the regime of competition.

It is stated that the cash working capital of the new company will be $6,500,000 and that all plants will be taken over free of debt. Of the preferred stock $4,500,000 and of the common stock $3,000,000 remains in the treasury. This points to the further acquirement of property. The prospectus estimates profits of $3,500,000 on the properties thus far taken.

THE two new continuous mills which Jones & Laughlins, Ltd., of Pittsburg, have started to build will be of the Morgan type, the contracts having been let to the Morgan Construction Co., Worcester, Mass., some time ago. The foundry and machine work will be done by Jones & Laughlins themselves, and they will also roll and fit the structural material for the buildings.

THE IRON TRADE REVIEW
AND
INDUSTRIAL WORLD.

DEVOTED TO MACHINERY, METAL-WORKING AND FOUNDRY TRADES AND IRON AND STEEL MANUFACTURE.

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ENTERED AT THE POST OFFICE AT CLEVELAND, O., AS SECOND CLASS MATTER

APRIL 6, 1899.

THE DUTY ON MACHINERY.

Since manufacturers of machinery, particularly machine tools, in the United States have been making trips to Europe and building up a trade in Great Britain and on the Continent, there has been more or less agitation among them, of the removal of our tariff on machinery. The general argument has been that this tariff is not protective, in view of the fact that we are exporting machinery; that it does not bring any special revenue, because our imports of machinery are very small; that it is not only a suggestion to manufacturers in Europe that a tariff might have advantages for them also, but is a source of irritation to the latter and invites retaliatory tariffs. But perhaps the circular letter below, which has been sent out to machinery manufacturers in the past week, better indicates the reasons urged for the abolition of existing duties on machinery:

MADISON, WIS., March 30, 1899.

Gentlemen:—Those who manufacture machinery for export must have observed the serious agitations there are especially in Continental Europe, in favor of retaliatory tariffs, and that such tariffs may be enacted in the near future. European manufacturers point to our protective tariffs as having been very advantageous for us, and argue that if good for us it is good for them. And it is certainly true, that they keenly feel the effects of American competition. It may be that as yet they are in no inconsiderable degree benefited in getting American machinery at comparatively low prices, which certainly is the case. Especially is this true of machine tools. But, while there is force in the argument that American manufacturing on the whole will not be seriously injured by the European protective tariffs, yet very few will contend that it will promote interests. American manufacturing is so well established, and American wares are so excellent that it would seem that the greatest possible commercial intercourse with the foreign nations would confer the greatest benefits on all.

On account of the lower wages prevailing abroad, the foreigner ought not to fear American competition while we certainly enjoy no insignificant advantages in greater natural resources, in cheaper railroad transportation, in cheaper iron and lumber, in more intelligent operatives, in better methods, and above all, in a much greater volume of production caused by the great purchasing ability of our people, and the consequent volume of consumption. It is, anyway, a fact, that in the line of machinery we need fear no competition, even if we have no duties on machinery at all. A little would, of course, be imported, but not enough to affect home demand.

The question then arises: As practically no machinery is imported, or will be imported if admitted free, why have any duties at all on machinery? It produces no revenue to speak of, and will produce none. The duty is now 35 per cent. Why not abolish it entirely, or reduce it to 5, or at most 10 per cent?

One of the proprietors of this company has been traveling in Europe in the interest of our business for the last two years, and as he speaks some of the Continental languages, gets pretty well acqainted with European sentiment. The manufacturers there would be satisfied if we would impose duties equal to those they impose. The writer of this letter has been and is a protectionist, when protection is necessary to promote our interests. But protection certainly in the machine line, has done its work. We feel that we neither need nor want the protective tariff, any longer, and we know there are leading members of Congress who have been protectionists, who feel the same way, and are ready to vote as they feel, if that is what our people demand.

Would it not therefore be wise for manufacturers of machinery to petition Congress to abolish protective duties on our line of products? We should be very much pleased to get your views on the subject, and if you favor it, we will send you a petition for signature, and would suggest that you also write to members of Congress so that action may be taken at the December session. But members of the next Congress ought to be made acquainted with the views of manufacturers at an early date, so that they can have ample time to consider the matter, and be prepared to act when Congress meets next December. Awaiting your early reply, we are yours truly, GISHOLT MACHINE CO.
J. A. JOHNSON, President.

While it must be admitted that if machinery manufacturers generally take the view expressed in this letter, there is little ground for others to urge the retention of the duties, we confess that we have not been convinced that the agitation going on in various lines for the removal of tariffs has been well defended. The machinery manufacturers who have met the European critics of our tariff face to face have evidently been given reasons that to them were sufficiently cogent, for this revision of our tariff policy. We cannot but believe, nevertheless, that there is something more in the suggestion than the sentimental reason given. Business and tariff policies are influenced by hard facts; and the particularly hard fact in this case is the large European demand for American machinery. To remove our tariff would not stop the export of American machinery, which is the thing that displeases the European agitators of retaliatory tariffs. If, as the above circular intimates, European manufacturers, with their cheaper labor, should not fear American competition, where is the motive for their agitation of tariffs against our goods? And if, as is also indicated in the circular letter, European manufacturers are willing that we should have tariffs equal to their own, is there not a suggestion in this concession that the amount of our present tariff, and not merely the fact of a tariff, is an irritation to foreign manufacturers? Is it certain that the day may not come when, having become proficient in the copying of American machinery, the cheaper labor of Europe will be in position to take advantage of free entry to the markets of this country?

The benefits of the American tariff to the machinery trade of the country, in protecting it from foreign competition in the period of development to its present magnificent proportion, are beyond question. Not less than the direct benefits are those benefits conferred by a broad, consistent system of protection, fostering industries whose prosperity has given the machine tool manufacturers the splendid home market that has been the pre-eminent stimulus to mechanical skill and invention. The benefits of the American tariff to American industry are a matter of record. The world knows it well; and wiping out any tariff schedule now will not wipe out this fact nor blind any foreign manufacturer who is hurt by the competition of our manufacturers, to the foundation reason for the srtength of his American competitor.

We are not committed to the tariff as a fetich, nor would we urge its retention as a matter of tradition; we simply urge that it is well to be sure that such a revolutionary change of policy will be of permanent benefit, or will even cure the feeling it is intended to allay.

STEEL MAKERS AS MINERS OF ORE.

The steps recently taken by producers of steel, particularly by large consolidated interests, to provide their own iron mines are an interesting phase of the present movement. The drift toward control of Lake Superior iron properties by steel makers has been exceedingly rapid, and there has been no little competition, in fact, for some of the choicer properties. It is probably true of iron mining companies, as of blast furnaces, steel works and rolling mill companies that their business is for sale to any comer who is willing to pay a sufficiently attractive price; therefore, if the present pace is long kept up the properties on Lake Superior that must go into the market to dispose of their product will be a small minority.

Within the past 10 days the newly launched Republic Iron & Steel Co. has practically concluded negotiations for properties on the Mesabi, Gogebic and Marquette ranges, as noted on another page. The Lake Superior Iron Co. deal has advanced so far that most of the stock has been placed in the hands of the officers of the company for transfer, and in the near future the transfer to the thus far unknown buyer will be completed. The National Steel Co., regarded in some quarters as the future owner, is known to have had very comprehensive plans for ore and fuel supply. Its option on another well known old-range property is likely to be taken up in due time. The American Steel & Wire Co. has been in the market for ore properties, also, and its purchase on the Mesabi has already been recorded.

Three years ago, the destination of less than one-third of the output of Lake Superior iron mines could be figured in advance of a season's opening. This year in round numbers 60 per cent of the ore mined will be smelted by mine owners. At the present rate of mine-buying, counting pending deals as good as closed, there will be less than 25 per cent of the production of 1900 to be sold on the market. The giants are bestriding the trade, with one foot on mines and the other on finishing mill.

PERSONAL.

C. L. Miller, general superintendent of the Joliet works of the Federal Steel Co., for nine years connected with the Illinois Steel Co., has resigned and will remove to Philadelphia.

James O. Nesbitt, formerly assistant master mechanic at the Edgar Thomson Steel Works, has gone to Ensley, Ala., to take the position of master mechanic of the Alabama Steel & Shipbuilding Co.

According to an official announcement, the following changes in the Carnegie Steel Co., Ltd., became effective April 1. Alexander R. Peacock, first vice president, will assume the duties and add the title of general sales agent. He will be assisted by Homer J. Lindsey, formerly assistant to the president (rails and billets), and H. P. Bope (structural steel), Charles L Taylor assistant to the president, will have charge of the operations of the mills, as to the filling of orders for product. He will be assisted by H. E. Tener, Jr., general agent (structural steel), and W. B. Dickson, special agent (rails and billets). George H. Wightman, formerly general sales agent, has been re-appointed sales agent at Boston.

H. H. Campbell, superintendent of the Pennsylvania Steel Co., has been made superintendent and general manager; Frank Tenney, assistant superintendent, has been made assistant to president; Howard F. Martin, formerly assistant to president, has been made general sales agent; John W. Dougherty, superintendent of the blast furnace department, will be assistant superintendent of the works, and Mr. Dougherty will be succeeded by Otto S. Burkhart, who for some time has been assistant superintendent of the blast furnace department.

Lewis Britton, superintendent of the Waukega, Ill., plant of the American Steel & Wire Co., has resigned and is succeeded by George Jewitt, formerly of Joliet, Ill.

U. E. Dennis, who was formerly superintendent of the American Tin Plate Co.'s plant at Elwood, Ind., has been appointed manager of the Monongahela plant on the South Side, Pittsburg.

Warner Leeds, formerly manager for the American Tin Plate Co. at Elwood, Ind., has been transferred to the Chicago offices, and is succeeded by Berthold Goldsmith, of Pittsburg.

Myron C. Wick, president of the Union Iron & Steel Co., Youngstown, previous to its absorption by the National Steel Co., has been prominently named for president of the new Republic Iron & Steel Co., at Youngstown, O., dispatch says.

S. T. Wellman, of Cleveland, and Capt. W. H. Jaques, of New York, were in London a fortnight ago, and attended the annual meeting of the Institution of Naval Architects.

Wages Advanced by Carnegie Steel Co.

(Special Telegram.)

PITTSBURG, April 5.—In accordance with action taken by the board of managers of the Carnegie Steel Co., Ltd., yesterday, notices were posted this morning advancing wages of all employes, except tonnage and contract men, at all the company's plants—Edgar Thomson steel works and blast furnaces, Duquesne steel works and blast furnaces, Homestead works, Carrie and Lucy furnaces, Keystone works and Upper and Lower Union mills. The advance for common labor is to $1.40 a day, and other labor in proportion, dating from April 1. It should be noted in connection with this action that comparatively little of the product going from the Carnegie mills, or to be turned out in the next three months, is on the basis of recently prevailing prices, sales being made for months ahead at the prices prevailing before the advance in iron and steel was marked. The increase in wages affects nearly 10,000 men.

FOR the meeting of the Foundrymen's Association at Philadelphia on Wednesday evening, April 5, the announced topic for discussion was the question, "Are foundrymen getting for castings prices consistent with the advanced prices of raw material? If not, why not?" The secretary's notice of the meeting intimates that while this matter has been touched upon at previous meetings, there is evidence that it calls for much thought and attention from foundrymen. Another question propounded for discussion at the same meeting was the following: "To what extent are molding machines used in foundries? What advantages have they other than those of an economical character?"

TIN PLATE PRODUCTION IN 1898.

The *Metal Worker* publishes a statement of the production of tin plate in the six months ending Dec. 31, 1898. It shows an increase compared with the preceding six months of 48,723,556 pounds of black plates and 13,353,683 pounds of finished tin plates.

The following are totals of black plate and tin plate production in the United States for the six months ended Dec. 31, 1898:

BLACK PLATES.

	Pounds.
Eastern mills	268,964,836
Western mills	193,874,159
Total	462,838,995

TIN PLATES.

	Pounds.
Eastern mills	162,101,271
Western mills	167,720,713
Dipping Works	*43,000,000
Total	372,821,984

*Estimated.

On the basis of 108 pounds to the box, which has been generally regarded as the standard weight, this would give a production of black plates for the half year ended Dec. 31, 1898, equivalent to 4,285,546 boxes, or at the rate of 8,571,092 boxes a year. Similarly the output of finished tin plate was equivalent to 3,452,055 boxes, or at the rate of 6,904,110 boxes a year. This raises the rate of yearly production, as compared with the previous half year's figures, 802,288 boxes of black plates and 247,290 boxes of finished tin plates.

In dividing the total product of black plates for tinning made in the latter half of 1898, namely, 462,838,995 pounds, by the number of mills in operation in that period (252) we find the average product per hot mill was 1,836,662 pounds, or 17,006 boxes, for the six months. This divided by 26 gives an average output per mill per week of 654 boxes of 108 pounds. The weekly average in the preceding six months was only 590 boxes. Considering that nearly all of the mills were shut down for a week or more at the close of the year, and some were idle at other times, the actual average, based on actual operation would probably be nearer 750 boxes per mill per week, showing the high degree of proficiency attained by the American tin plate mill workers.

The following table shows the output of black plate for tinning and of finished tin plates in the United States for each calendar year since July 1, 1891, when the industry was started in this country. They are the government statistics to June 30, 1897, and the *Metal Worker's* figures for the three last six-monthly periods:

Production of black plate and tin plate in the United States in calendar years from July 1, 1891, to Dec. 31, 1898:

BLACK PLATE FOR TINNING.

Period from—	Pounds.
July 1 to Dec. 31, 1891 (half year)	8,778,113
Jan. 1 to Dec. 31, 1892	40,478,816
Jan. 1 to Dec. 31, 1893	71,673,146
Jan. 1 to Dec. 31, 1894	125,795,171
Jan. 1 to Dec. 31, 1895	278,223,707
Jan. 1 to Dec. 31, 1896	366,180,809
Jan. 1 to Dec. 31, 1897	601,890,476
Jan. 1 to Dec. 31, 1898	676,954,424
Total products for 7½ years	2,369,974,672

TIN AND TERNE PLATES.

Period from—	Pounds.
July 1 to Dec. 31, 1891 (half year)	2,236,743
Jan. 1 to Dec. 31, 1892	42,119,192
Jan. 1 to Dec. 31, 1893	123,606,707
Jan. 1 to Dec. 31, 1894	166,343,409
Jan. 1 to Dec. 31, 1895	225,004,869
Jan. 1 to Dec. 31, 1896	369,429,796
Jan. 1 to Dec. 31, 1897	574,759,628
Jan. 1 to Dec. 31, 1898	732,290,285
Total product for 7½ years	2,235,590,629

The statistics presented in the *Metal Worker* of September 24, 1898, showing the output of black and tin plates for the first half of 1898, and those given above for the latter half of the same year, added together make the total production of the American tin plate industry for the calendar year 1898 as follows:

BLACK PLATES.

	Pounds.
First half of 1898	414,115,439
Second half of 1898	462,838,995
Total for 1898	876,954,434

TIN PLATES.

	Pounds.
First half of 1898	359,468,301
Second half of 1898	374,821,984
Total for 1898	732,290,285

Being equivalent to 8,120,000 108-pound boxes of black plates and 6,780,465 boxes of finished tin plates for the calendar year 1898.

From the above it will be seen that the output of both black and tin plates in the year 1898 was enormously ahead of that of 1897. The excess in the production of black plates was no less than 275,163,948 pounds and that of finished tin plates 157,530,657 pounds, representing an increased output for the past year over 1897 of more than 2,500,000 boxes in black plates and of nearly 1,500,000 boxes in tin plates.

The totals of production of black plates and tin plates given in the above list show that since the American tin plate industry was started in 1891, 2,369,974,672 pounds, or 1,058,024 tons, of black plates and 2,235,590,629 pounds, or 998,031 tons, of finished tin plates have been produced in this country. In boxes of 108 pounds the equivalents would be 21,934,941 boxes of black plates and 20,709,172 boxes of tin plates.

Hoop and Cotton Tie Consolidation.

Some negotiations have been under way for a merging of the hoop, band and cotton tie mills of the country, apart from that at Joliet, Ill., which rolls cotton ties. Some tonnage arrangement with the Federal Steel Co. might be made in the case of this single mill. The well known manufacturers of hoop and band steel and cotton ties are J. Painter & Sons Co., of Pittsburg; Lindsay & McCutcheon, proprietors of the Star Iron & Steel Works, Allegheny; Wm. Clark Sons Co., Solar Steel Works, Pittsburg; the Monessen Steel Co., Monessen, Pa., recently started; Portage Iron Co., Ltd., Duncansville, Pa.; P. L. Kimberly & Co., Sharon, Pa., (the Greenville mill rolls hoops and bands); Pomeroy Iron & Steel Co., Pomeroy, O.; Union Iron & Steel Co., Youngstown, O. The yearly output of hoops and bands is said to be between 300,000 and 400,000 tons. The mills named above produce upwards of 450,000 tons a year of various finished forms, including skelp, bars and merchant steel. It is not certain that the Union Iron & Steel Co. will be separated from the National Steel Co., and attached to the American Steel Hoop Co.; but the promoters of the new consolidation are prominent in the National Steel Co. and the two corporations are expected to work in harmony. The three furnaces of the Isabella Furnace Co., a related interest of J. Painter & Sons Co., are expected to be included in the new consolidation.

Industrial Notes.

The directors of the Bethlehem Iron Co. met in Philadelphia last week and decided to issue a call for a meeting of the stockholders to be held in Bethlehem April 15 to vote on the proposition to lease the company to the Bethlehem Steel Co. A resolution was adopted that a stock dividend of 50 per cent, or one share for each two shares now held, be declared out of the accumulated earnings of the company, payable in scrip, to the stockholders of the company, the scrip to be convertible into stock of the company on or after May 15, 1899, when presented in sums equivalent to whole shares.

The National Steel Co. announced on Monday a 10 per cent advance in wages for the employes at the plants at Mingo Junction and Bridgeport, O., formerly owned by the Ætna-Standard Iron & Steel Co. The advance takes effect at once.

The Illinois Steel Co.'s new slabbing mill at South Chicago has started very smoothly. Some time has been required to organize a working force, so that the mill has been run on day turn only, but it is now to be run double turn. The output of the plate mill will be greatly increased by this plant, but it will roll billets as well as slabs, thus furnishing open-hearth stock for the company's merchant bar mills.

The Empire Steel & Iron Co. recently formed in New York, which is purchasing a number of idle furnace plants which it will develop, has bought the Bay State furnace at Fort Payne, Ala. It may take up other Southern furnaces. The company has, in addition, stacks at Bellefonte, Pa., and Greensboro, N. C.

It has been authoritatively announced that the Cambria Steel Co., Johnstown, Pa., will make improvements this summer aggregating $1,000,000 in cost.

THE CARE OF PATTERNS.

I wish to enter a plea for the more careful usage of patterns in foundries. Constant observation leads me to believe that a few remarks of this nature are needed. At least this is true of New England, and, reasoning from the fact that human nature is alike the world over, it must be true of the rest of the world. By observation in a first class pattern shop we shall find that the workmen are very careful of the patterns, and that they seem to take pride in the product of their skill, handling the patterns with the utmost caution, to avoid marring or otherwise injuring them; and that they construct them with a view to giving the greatest possible strength, and to the thwarting of that arch enemy of patterns, viz., moisture.

A good workman will never lay a piece of wood flat on the bench, but will stand it up in such a manner that the air will have free access to every part of it; for, if it were allowed to lay with one side exposed to the atmosphere and the other protected by the bench, the exposed side would give off more moisture than the protected side, causing the cells to contract more rapidly on the exposed side, thus producing warp. If, in the course of constructing a pattern, an accident, such as a careless blow of the hammer, produce an indentation, a skillful pattern maker can usually take it out by simply dropping a little hot water on the spot, thus causing the wood to swell out to its former smooth, even shape. But the molder who should try this in the foundry would be foiled, because, after the three coats of shellac have been applied, no water can penetrate the wood fibre. Another noticeable thing in the pattern shop is the care and accuracy bestowed on the work to make it conform to the sometimes almost innumerable dimensions given on a complicated drawing, which, to the uninitiated would look as unintelligible as the "no checkee, no washee" slip of the almond-eyed heathen. Besides this, the pattern-makers' drawing gives not an inkling of information relating to core boxes, amount of finish to leave or where to provide draft to facilitate molding, this being left to the pattern-maker. So much, as to the requisite care, patience and brains, in the construction of a good pattern. The strongest argument for careful usage remains to be stated, viz., the expense of construction. When we consider that the designing and detailing in the drafting-room, from which the pattern is made, often reaches far up into the dollars, and that every hour's work of the pattern-maker costs from 25 cents up, according to locality, and that pattern lumber is very costly, is it unreasonable that the molder should be asked to exercise great care in his use of the pattern.

The condition in which patterns are sometimes returned to the shop for repairs causes the pattern-maker to groan inwardly, and the owners to use vehement language outwardly, and audibly as well. The pattern maker wonders that the molder does not take the utmost pains to keep the pattern in perfect shape, in order that it may work smoothly and with the greatest ease. On the other hand, the molder is apt to claim that the pattern was poorly constructed at the outset, was minus draw-plates, had back draft, and consequently had to be rapped excessively in order to get it out of the sand. What is the remedy? 1st. The construction should be as strong as possible, from dry wood, with reference to the prevention of warping, and resisting changes in the atmosphere. 2nd. Affix draw-plates when the shape of pattern will permit, and, on heavy work, additional plates for rapping. 3rd. On thin work, make a solid form on which to ram the drag without springing the pattern out of shape. This may, in some cases, be used as the sole mould-board; in others, simply as an intermediate piece between the pattern and the follow-board.

As a complement to these requirements made upon the pattern-maker, the molder is under quite as many, and as imperative obligations, among which may be named the following, viz.: 1st. Make use of the draw-plates, invariably, and be as merciful as possible in the rapping process. 2nd. Allow patterns to lie on the foundry floor only when necessary, and subject them to as little moisture as possible. 3rd. Handle them with great care, mindful of the fact that they are very costly.

It is the general custom in New England to varnish patterns black; but I have in mind one large establishment where light varnish is used, for the following reasons, viz.: The center lines show more plainly, for the inspector's use when measuring; also, these working points are easier to see when alterations are required. The patterns also receive better care in the foundry, for the molder cannot hide the blemishes caused by his carelessness on a light colored pattern as he can on a black one, and so, he is held to a strict account for the condition of all patterns used by him.

Proper storage is no small factor in the life and usefulness of a pattern. Dampness and strong sunlight must both be avoided. Sunlight will blister the shellac and start the beeswax fillets and nail holes, besides causing trouble from warping. A basement or an attic is neither so suitable as some place where the temperature will range more evenly throughout the year, and the location of a pattern loft should always be, of course, where the patterns will be kept dry, whatever else may befall them.—[John M. Richardson in Foundry.

West Duluth Furnace to be Started.

The Thomas Furnace Co., of Niles, O., has purchased from the Franklin Trust Co., representing the bondholders of the Duluth Iron & Steel Co., the blast furnace at West Duluth, Minn. It is a 75 x 16½ stack, rebuilt in 1893 and idle since that year. It is the purpose to ship coke by vessel from lower lake port, though when the furnace was in blast the last time its fuel supply was largely coke made at Duluth from Connellsville coal. The Thomas Furnace Co. owns the Etna mine on the Mesabi range, but it has not been wrought for the past two years. The ores used will naturally be from Minnesota ranges, including a considerable percentage of Mesabi ore. It is expected that the furnace will go in blast on foundry iron about June. 1. The Thomas Furnace Co., it will be recalled, sold its Thomas Furnace at Niles, O., recently to the National Steel Co. It is reported that the furnace had been under option to the Ohio Steel Co. for some time.

The property at West Duluth transferred to the Thomas Furnace Co. includes the furnace and its site, and the land on the water front, in all about 75 acres. In addition the new owners have arranged for the purchase of a property about 500 feet wide from the car works property which adjoins the furnace site. This will give about 25 acres more. On this property a dock for the unloading of fuel, limestone, etc., and for the loading of pig iron, should any of the product be shipped East, will be built. A channel to this dock will be dredged.

In the factory of the Grant Ball Co., Cleveland, large quantities of oil and emery are used for grinding, and the oil finally becomes so thickened with particles of emery and steel as to make it of the consistency of mud. In the city where this material accumulated no other way of disposing of it could be found except to pay for its removal outside of the city limits, for it was of such a character as to make it practically impossible to dispose of it in any other way. Finally the managers hit upon the plan of running it through a centrifugal cream separator, which completely separates the particles of emery and steel and runs the oil out at a separate spout, so that it can be used over again, while the mixed emery and steel can be disposed of much more readily than when, as formerly, mixed with oil.—[American Machinist.

An officer of the A. & P. Roberts Co., proprietors of the Pencoyd Iron Works, Pencoyd, Pa., is quoted thus in reply to the comments of Rigby & Westwood, English bridge builders, who bid on the contract the Pencoyd Works took, for a 1,100-ft. bridge over the Atbara river, in the Soudan: "Of course the English firms feel piqued at our successful bid for work in what they regard as their own territory. Mr. Rigby shows great ignorance of American resources. I scarcely need say there was nothing underhanded about our securing the contract. Mr. Rigby's remark that no firm could turn out a bridge of the size needed in the time we have, will make American bridge builders smile. Instead of preparing the work in seven weeks, we could have done it in seven days, if absolutely necessary. Englishmen require too much time for thinking in the bridge building business."

DEVELOPMENT OF BROWN PYROMETERS.

Mr. Edward Brown, of Philadelphia, who for the last thirty years has made a special study of the science of measuring and recording temperatures in metallurgical operations, is well-known to blast furnace managers for his "stationary hot blast pyrometer" and his "portable testing pyrometer," as well as for other specialties for furnaces. In connection

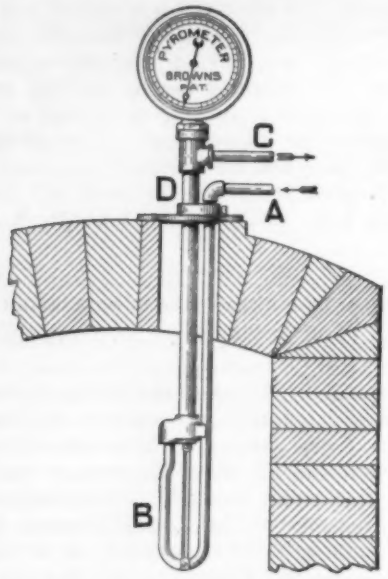

FIG. 4.—WATER CURRENT PYROMETER.

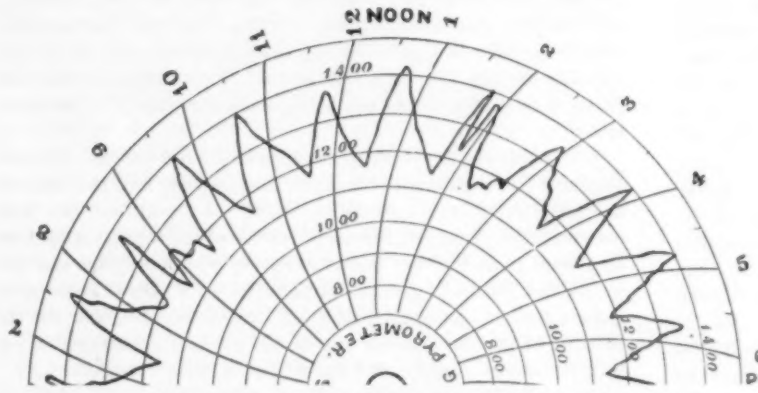

FIG. 7.—CARD FROM FIRST RECORDER MADE, 1895. PROBABLY NO COLD AIR ADMITTED.

with a description of Mr. Brown's improvements in pyrometry, a brief reference to the general development in this line may be interesting:

The original stationary pyrometer, being in appearance identical with those in common use to-day, was patented about 1850 by Gauntlett, of England. The stem was of metal, brass and iron. This style was made and sold in the United States by several makers and though overrated as to its suitability for high temperatures, it had considerable sale for bake ovens, and if inserted always to the same depth was fairly accurate up to 600 degrees. It held its place as the only available instrument up to 1870. About this time the temperature of blast from iron stoves was much increased, occasionally running up to 1,000 degrees, and the demand was great for an indicator for this temperature. In 1870 Mr. Brown brought out his graphite stem pyrometer, Fig. 1, which was still further improved in 1872 by making the inside rod of the stem above the graphite of the same metal as the stem, so that the stem could be inserted to varying depths and still indicate nearly accurately. This form of pyrometer soon became the only one in general use. Of this and the portable pyrometer Mr. Brown has sold over 2,500,—numerically his products commanding the trade. With the advent of brick stoves producing a temperature up to 1,500 degrees, the most available instrument for many years was Brown's portable pyrometer, Fig. 2, in which a mixture of hot and cold air impinged upon the expansion bar. An earlier instrument, Hobson's, on the same principle, the diluted blast being thrown against a thermometer, was generally used in England and the Southern states. The Siemen's water pyrometer has had considerable sale, also, for temperatures up to 1,800 degrees. Then came the pneumatic pyrometer of Uehling & Steinbart for temperatures up to 3,000 degrees; and lastly that based upon the electric current from a platinum couple. The above embrace the pyrometers in extensive use commercially, no mention being made of a number of valuable and accurate instruments, available chiefly for laboratory researches.

In 1894 the tin plating industry had gained some headway in the United States and Mr. Brown then further improved his graphite pyrometer, making it more accurate, especially available for melted metal baths varying in depth. There were sold 150 for use in tinning pots, these no doubt contributing largely to the success of the American enterprise in its infancy, in the face of severe Welsh competition.

In 1893 Mr. Brown brought out his annealing oven pyrometer, illustrated in Fig. 3. This invention is entirely novel in principle. A thin strip of platinum is brought in a few seconds to the full temperature of the furnace; and being connected by a rod to the mechanism in the head moves the pointer in proportion to the expansion of the strip. The strip is hung within the heavy frame K, which is only warmed a few hundred degrees, while the platinum is going to 3,200 degrees or above the melting point of steel. No pyrometer is so readily available, without any preparation, to indicate temperatures up to the melting point of steel. This instrument has to be cooled off, which takes about 20 minutes, before it can be used again.

Then came in 1895 Mr. Brown's water current pyrometer, Fig. 4. It is easy to see from the illustration of this, how

FIG. 5.—RECORDING APPARATUS.

FIG. 2.—BROWN'S PORTABLE PYROMETER.

FIG. 1.—BROWN'S STATIONARY PYROMETER.

naturally one invention developed into the other. It only required that the heavy solid frame K of the annealing oven pyrometer be kept from melting off, and a stationary pyrometer to 3,000 degrees was secured.

This was done by running a stream of water through it. The water enters at A, flows through the loop B, through stem

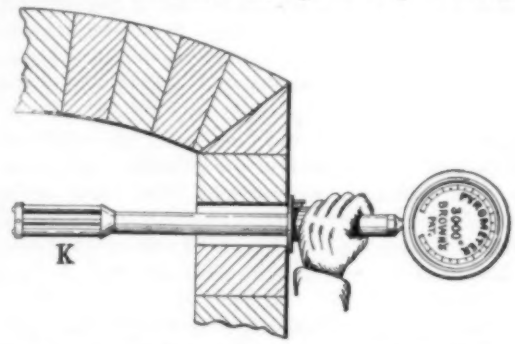

FIG. 3.—ANNEALING OVEN PYROMETER, TO 3000°.

D and out at C. A platinum expansion bar, hung in the loop B, is connected by a rod with the indicating pointer. It is connected to the water supply by rubber hose, and, though intended for use as a fixed or stationary pyrometer, it can easily be carried from one opening to another in the furnace. This pyrometer is not to be confounded with water current pyrometers in which a pipe carrying a current of water is led through a furnace and the temperature of the water indicated

by a thermometer. A prominent defect in pyrometers based on the latter principle and usually overlooked is this: A current of heated gas or air at 2,000 degrees passing over a water pipe at a given draft or velocity, will heat it much hotter if passing at twice the velocity. Theoretically this must be the same with air circulating in place of water, though the error is far less than with the liquid. To the question, why does this not destroy the utility of the water current pyrometer? the designer answers: This is provided for in the rod which passes from the expansion strip to the pointer. This rod takes its temperature from the water current, and serves to neutralize any error due to a rise or fall in the temperature of the frame D. This instrument is also made recording.

In 1896 Mr. Brown made his stationary hot blast pyrometer recording, Fig. 5, by means of special mechanism and clock work. A pyrometer is subject to frequent handling, and it is important the head B, containing the recording chart, should be small and at the same time the degrees be large enough to indicate the fluctuations plainly. The indicating mechanism must also be so connected to the stem that the powerful expansion and contraction will not damage the delicate mechanism of the head. The accompanying chart full size, shows how well this is carried out. Only the degrees from 700 to 1,500 are marked on the chart, this being the extreme of the range likely to be of service in blast furnace practice. The chart, Fig. 6, shows the hot blast regulated by the admission of cold blast. The other chart, Fig. 7, was taken three years ago from a furnace probably without any admixture of cold blast, through a pipe connected for that purpose. Fig. 6 is worth special attention. The chart was taken March 21, 1899, and the photographic reproduction is from an original card the same size. This shows accurately the time to the minute when each stove was changed, also the exact amount of heat within five degrees given by each stove in the set of three. No portable pyrometer used occasionally, as a standard, will give this information. Furnace managers who have questioned whether the rise and fall of stove temperature affected the furnace, have an opportunity here to ascertain what variation is harmless. These instruments are also useful for the blast furnace down-comer pipe, and for recording temperature of the escaping gas from steam boilers.

The value of recording devices is every year more appreciated. Instruments for this purpose have been in extensive use for many years, chiefly for steam pressures and low temperatures. The advances in pyrometry are so rapid it is difficult to keep track of them. We have only to go back a very few years, perhaps eight or 10, to find the time when no recording chart was to be had of a 1,400 degree temperature. The suggestion was then made at a meeting of an English scientific body, that the pencil of light from the platinum couple could be transferred to a traveling photographic film and leave a record. The Brown pyrometers are all marked by great simplicity of construction, a very important feature when they are to be placed in the hands of ordinary workmen and laborers. The cuts explain themselves without any elaborate description.

The Franklin Institute of Pennsylvania in 1897 awarded to Mr. Brown the John Scott legacy medal and premium "for improvements in pyrometers." The Scott medals are highly prized, being awarded only on approval of the standing committee on science and the arts.

Compressed Air Applications.

At the meeting of the Franklin Institute at Philadelphia, March 9, a number of engineers and representatives of manufacturing companies took part in a discussion on the recent applications of compressed air. W. L. Saunders, C. E., vice-president of the Ingersoll-Sergeant Drill Co., spoke first, giving some history of the development of compressed air equipment, and a surprising (to many) list of the lines of service in which it had wrought wonders. Of the discussion following we make extract from the *American Machinist's* account:

Mr. Christie, chief engineer of the Pencoyd Iron Works, spoke of the extensive and highly satisfactory use of compressed air in that establishment, and of its economic value, notwithstanding that a large proportion of the air was lost by leakage or was wasted by the men. He mentioned specially the use of a jet of air to blow away the dust from an emery wheel working on steel, the blowing away of the dust and the comfort and health of the workmen being the only object intended and expected to be accomplished, but there was also a very appreciable increase in the work of the wheel. The jet of air kept the wheel cleaner and made it cut more freely and also kept the steel cooler. A number of pneumatic hammers, riveters, drills and other tools were exhibited, and the representatives of the makers spoke of the applications of them. A good word was said for the rotary type of motors, because they are balanced and run without jar or rattle, although they are very wasteful of the air, one speaker saying that the piston motor could be run by the leakage of the rotary. Attention was called to the freezing up of the pneumatic tools and the choking up of pipes by the congelation of the moisture carried in the air. It was argued that more attention should be given to the piping of the receiver, it being claimed that the location of the pipes leading into and out of the receiver largely determined the amount of moisture collected there. Not enough prominence was given probably, to the greater necessity of having the air as cold as possible in the receiver in order to precipitate the moisture.

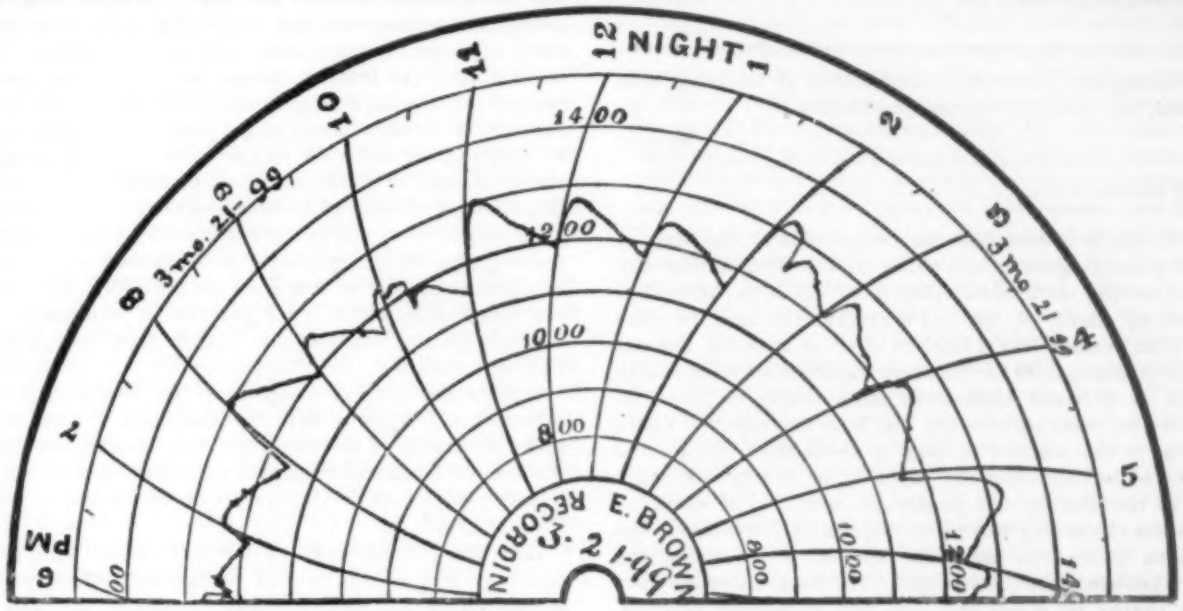

FIG. 6.—BLAST FURNACE PYROMETER, INDICATING CHANGES OF STOVES.

It had been the expectation that the steel rail department of the Ohio Steel Co., Youngstown, O., would be ready for operation by April 1. The buildings in which straightening and drilling are to be performed are about ready; but there is delay on the delivery of equipment.

MANGANESE IN ACID OPEN-HEARTH STEEL.*

BY F. A. MATTHEWMAN.

The author hopes to present as completely as possible the principal effects of manganese in the open-hearth process. The majority of the statements and deductions contained herein are founded principally on practical observations of weighed charges, and calculations made from the materials employed and the metal and slag at various stages of the process. If we assume the average content of our pig iron as silicon 2.75 per cent and manganese 1.2 per cent, and that the scrap used contains 0.05 per cent silicon and 0.5 per cent manganese, we obtain the following as the theoretical production of slag by a charge, containing 80 per cent pig iron and 20 per cent scrap (using four cwts. ore per ton of steel, the ore containing the following impurities—silica, 7 per cent; lime, 5 per cent; oxide of manganese, 1¼ per cent.)—

100-CWT. CHARGE

80 cwts. pig at 2.75 per cent. Si=2.20 Si 20 cwts. scrap at 0.05 per cent. Si=0 01 Si	.221=4.62	Cwts. silica.
Sand from 80 cwts. pig at 2 per cent	1.60	"
Silica from 20 cwts. ore at 7 per cent	1 40	"
Silica from hearth of furnace†	2.50	"
	10,12	"
Lime from 20 cwts. ore at 5 per cent.	1.00	lime.
MnO " " " 1¼ per cent.=0 5 cwts. MnO		
80 cwts. pig at 1.2 per cent Mn=0 96 cwts 20 cwts. scrap at 0.5 per cent. Mn=0.10 cwts.	1.06 Mn=1.37 MnO	1.62 MnO.
Assuming finished slag to contain 25 per cent FeO, we obtain		
$\frac{12.74}{3}$ =4.24 cwts. FeO	4.24	FeO.
Total weight of slag from 5 tons (100 cwts.) charge	16.98	cwts.

Calculating the percentage composition of the slag thus produced, the following figures are obtained.—

	Per cent.
Silica	59.6
Lime	5.9
Oxide of manganese	9.5
Oxide of iron	25.0

It will readily be seen that the composition of the slag of necessity varies greatly, according to the composition and quantity of the materials employed, as well as to the method of working; and it is not claimed that the analysis here given is an average, but it is given to show that the amount of oxide of manganese in the slags obtained in open-hearth practice in Scotland approaches more nearly 10 per cent, while, if the manganese in the pig iorn exceeds the figure taken, or if the amount of slag is reduced, either by the presence of less silicon in the pig iron or the use of more scrap in the charge, the percentage quantity of oxide of manganese in the slag will be correspondingly increased, and may even exceed 10 per cent. Indeed, it is within the writer's knowledge that this figure has been exceeded—not in one charge or a selected few, but in regular practice, analysis of an average sample of fifty slags collected (not selected) during a period of two months' working in the year 1897 showing 13 per cent MnO.

Manganese in the Ores.—From the above calculation it will be seen that the amount of slag produced in the working of an average charge is approximately equal to the amount of ore used. It therefore follows that the percentage of oxide of manganese in the slag which has been derived from the ore is the same as the percentage amount of this constituent contained in the ore. If the composition of an ore in other respects was satisfactory, and effected the oxidation of the impurities of the charge with the same economy, the higher percentage of oxide of manganese would not diminish its value to the steelmaker; and, in view of the probable scarcity of the ore which has been almost the only one employed in the open-hearth process for many years, the possibility of the economical use of other ores for the same purpose becomes a question of importance to all steel producers. Some manufacturers have used extensively, with results satisfactory to themselves, the rich ores of Cumberland and Elba.

Manganese in the Pig Iron.—As we have already seen, this is of far greater importance than the percentage of oxide of manganese in the ore. Even with a charge initially comparatively low in manganese, the metal contributes by far the greater proportion of the manganous oxide in the slag. More than 5 per cent of manganese is objectionable, not only on account of the delay it causes, but also on account of the destruction of the silica bottom.

These objections constitute (along with the loss of yield due to the presence of so readily oxidisable an element) the objections of the steel makers to its presence to-day. It is the effect on the economic conduct of the process which is feared, and not the influence of the constituent on the finished product, the manganese in the initial charge being entirely removed by oxidation before the period of "boiling" commences.

It is an axiom which admits of no discussion that manganese causes delay, but it is somewhat difficult to differentiate between delays due to excess of silicon or manganese and those due to imperfect knowledge on the part of those responsible for the working of the furnace; but, as manganese is so readily oxidisable and is eliminated along with the silicon, it may be safely assumed that the delay it causes, if any, is inappreciable.

The reduced yield consequent upon high manganese is self-evident. Although the presence of 0.5 per cent of manganese in pig iron undoubtedly leads to a loss of ½ per cent when such iron is converted into steel, it is by no means certain that the presence of a further 0.5 or 0.7 per cent of this constituent increases the loss to a similar extent; on the contrary, although the manganese is completely removed during the melting stage from a charge with about 0.5 per cent, charges initially high retain a considerable proportion when melted—Willis says "about 50 per cent of the total amount, varying slightly with the temperature of the furnace," and the writer has, in some instances, obtained melted samples containing 1 per cent of manganese (0.6 to 0.8 being of frequent occurrence), and as this is removed during the process of feeding with ore it is probably accompanied by a reduction of a similar amount of iron from the ore added, in which case the Scotch iron, with 1 or 1.2 per cent of manganese would cause no greater loss than the English iron containing only half that quantity.

Further, the oxide of manganese, thus produced, is capable of replacing ferrous oxide in the slag; and if this action is taken advantage of the amount of iron thus replaced must be credited to the excess of manganese, in which case the extra quantity would not only prove no objection, but a source of distinct gain.

A further possibility which must not be lost sight of is the fact that just as silicon and manganese act as protective agents during the melting stage, protecting the iron itself, from oxidation, so manganese may (being more readily oxidised than silicon), protect this latter element to some extent and allowance would then require to be made for the iron which would be reduced from the ore by the silicon thus saved from atmospheric oxidation during the melting stage. But, as the amount of iron reduced from the ore falls considerably below the calculated theoretical quantity which should in this way be added to the charge, and as the furnacemen, from deficiency of heat or other cause, may delay commencing to "feed," thus causing loss of manganese by the oxidising action of the flame, we may conclude that, whereas the presence of 1.2 per cent of manganese in pig iron possibly causes no more loss than 0.5 or 0.6 per cent, any further increase would tend to waste.

Oxide of manganese undoubtedly exerts a strongly corrosive action on the sand of the acid Siemens hearth, but this is no less the case with oxide of iron. When a piece of iron or steel scrap is allowd to melt on the banks of an acid furnace, the oxide of iron produced during the melting instantly attacks the silica of the hearth, forming a fusible ferrous silicate, the banks being "cut" in such places as the drops of melting steel trickle upon. Notwithstanding this action, it would not at the present day be seriously argued that it was dangerous to melt steel in contact with the bottom; in fact, the amount daily charged on the furnace bottom in America, even in acid practice, is so great as to entirely discount any fear which many of the old school of melters still retain.

It is evident that the extent to which a furnace is cut is

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* Abstract of paper read before the West of Scotland Iron and Steel Institute.

† Campbell gives 1,200 lbs. as the average wear of the hearth in a series of 15 consecutive 60,000-lb. charges of two-thirds scrap and one third pig, and assumes that in the pig and ore process the wear would be 1,800 lbs. In the above calculation it is taken at 1,500 per 60,000 charged, i. e., 2½ per 100.

directly proportionate to (among other things) the richness of the slag—the slag or cinder rich in ferrous oxide which trickles from melting scrap, and the slag from melting ferro-manganese or manganiferous pig iron, are equally hurtful. It is pertinent, therefore, to enquire what constitutes an inert slag and what proportion of ferrous oxide or manganese oxide (or both) can be considered allowable. Probably no slag can properly be described as inert, as even if so constituted as not to attack the hearth by chemical action there will inevitably be a certain amount of scorification arising from the mechanical agitation following each addition of ore; but as some slags are undoubtedly more corrosive than others it will be advisable to revert once again to a consideration of the composition of melting-furnace slags. Mr. H. H. Campbell says: "There is a force at work in an acid furnace constantly creating a slag with 50 per cent silica and 45 per cent of ferrous oxide plus manganous oxide." If this be conceded the natural inference is that such a slag is as nearly inert as need be, and the slag resulting in our practice containing 10 per cent more silica (the fluxing constituents being reduced by the same figure) is even less harmful.

Even when the manganese in the pig iron reaches 2 per cent and the silicon and sand are reduced to 1½ and 1 per cent, respectively, the slag produced need be no richer than the typical slag given by Campbell. Calculation in the same manner (assuming the wear of the hearth to be the same, and again taking the amount of ferrous oxide as 25 per cent) yields a slag of the following percentage composition:—

Silica,	51
Lime,	7
Manganiferous oxide,	17
Ferrous oxide,	25

Slags of similar composition to the foregoing are frequently quoted in Mr. Campbell's book, which gives the average manganous oxide in slag from several charges as 15 per cent, while in no place does the author speak of such slags having any harmful effect on the hearth of the furnace.

Open-hearth practice in the States, however, differs considerably from the practice in this country; for whereas in this district the charge is principally composed of pig iron, the general practice in America has been to use 75 per cent of scrap, thus decreasing the quantity of carbon and silicon in the charge, and thereby diminishing the time the slag is in contact with the hearth of the furnace. The relatively small quantity of ore required in American practice permits of the automatic regulation of the composition of the slag suggested by Campbell; in this country, on the other hand, the method of charging the scrap on the top of the pig iron, exposing it to the full oxidizing influence of the flame, tends to the formation, during the melting period, of a slag rich in ferrous oxide; and as the melter during the succeeding operations makes additions of ore when he "thinks advisable, rather than when it is absolutely necessary," the slag is not given the opportunity to adjust its composition, but is usually kept so rich in oxide of iron that the banks of the furnace are severely attacked during the working of every charge, whether the slag is rich in manganous oxide or not.

In the author's opinion, the practice of allowing this automatic adjustment of the composition of the slag—or, in other words, permitting the carbon of the bath to reduce the excess of oxide of iron from the slag—is attended with considerably less corrosion of the hearth. The stoppage of feeding tends neither to diminution in production (loss of time in working) nor to a lessened yield. The practice of driving with ore to the last moment, on the other hand, causes considerable loss, by reason of the excessive quantity of oxide of iron which is wasted in the slag. Thus, whereas the amount of oxide of iron in an average sample of 50 slags was only 19 per cent, a selected sample of variant practice illustrating the effect of driving (the same quality of pig and ore being employed) showed 28 per cent of ferrous oxide with 10 per cent of oxide of manganese.

Notwithstanding all the arguments contained within the foregoing lines, it will still be maintained that such theoretical reasoning is totally insufficient to combat the undoubted fact that not only manganiferous pig iron, but even "black" ore, has casued considerable and serious difficulty in practice, the bottom of the furnace being completely destroyed, often coming up in lumps amongst the charge, and necessitating extensive repairs before the furnace was again ready for use. It is very improbable that the extra 2 or 3 per cent of manganese contained in the "black" ores is responsible for so serious an action as this. The slag in American practice often contains as much as 20 per cent of oxide of manganese It would be expected that, if this element was in itself responsible for the trouble, the bottoms of the American furnaces would be constantly going wrong, as the writer has never obtained a slag containing more than 19½ per cent of manganous oxide even when using highly manganiferous pig iron. The cause of the trouble must, therefore, be looked for in some other direction and the most obvious explanation appears to be as follows: The sand bottom formed when commencing to work a new furnace is always more or less porous and however carefully the operation of bottoming is performed it not only absorbs a large quantity of the slag charge used for "washing," but it also appropriates a considerable percentage of the first charge or two melted thereon. Further, no matter what care and attention is bestowed upon the "fettling" after each charge, pieces of the bottom will occasionally give way and be found "bad," when the furnace is tapped, and whether "splashed", "washed," or "dried" out, a greater or less quantity of metal will remain in the bottom, which in course of time becomes so impregnated with metal as to need flowing and remaking. Under these conditions, it is evident that no furnace bottom is so hard and free from metal as might be wished, and if from any cause the heat of the metal of the charge is higher than usual, it will at once attack the weak spots and cause the bottom to "come up," partially or wholly, according to the quantity of metal which the sand retained; and as the heat produced by the combustion of the carbon in the bath is better retained by a thick slag than one which is rendered fluid by the presence of an excess of ferrous oxide, it follows, as a natural sequence, that if the automatic adjustment suggested by Campbell takes place in a furnace, the man in charge of which is accustomed to working with fluid slags, the extra viscosity produced by the lessened amount of ferrous oxide causes the bath of metal to be hotter, and thus to find the weak places, if any, in the bottom.

The remedy for such trouble evidently is to permit this automatic adjustment to take place and to regularly work with more viscous slags than is generally done. The necessary heat for tapping would then be more easily obtained, the brickwork of the furnace would last longer, the corrosion of the slag line would be lessened; and when the furnaceman was thus trained to judge the heat of the metal itself rather than that of the furnace, the use of manganiferous ore and, if needful, more highly manganiferous pig iron, would not be attended with such serious consequences as it appears to have been in the past.

This paper has not been written with a view to encourage the manufacturers to increase the percentage of manganese in the pig iron they produce, but to present the opinions deduced from a series of observations undertaken with the view of gaining experience which would prove of service in the event of the failure of the supply of Campanil ore, which has been so long threatened.

Possible Pig Iron Shortage in Great Britain.

The possible effect of the conditions in the iron trade of the United States upon the situation in Great Britain are thus discussed by the London *Iron and Coal Trades Review:*

"The fact that there was a decline of pig iron output in 1898, and that there is at present a boom in the trade which threatens to develop into something like an absolute scarcity, in view of the large Continental demand and the almost certain decline of American supplies, is causing some anxiety as to the future. In some quarters there is a talk of having more furnaces blown in. Others are seriously thinking whether a lot of new furnaces should not be built. It is a number of years since the latest and only new furnace plant was constructed in Great Britain—that of the Dowlais Co. at Cardiff. The Dowlais new furnaces can produce 1,500 to 1,800 tons of pig per week, and it is believed that they can do this at little more than 35s per ton. Surely if other new furnaces could be constructed to produce pig at the same price, there could be very little mistake in building in the same locality, or anywhere else."

THE KEENE VERTICAL BOILER.

The Keene compound vertical safety boiler, designed by Philip J. Keene, superintendent of the boiler department of Fraser & Chalmers, Inc., Chicago, is called "compound" from the fact that it has water tubes, fire tubes and a feed-water heater combined with the boiler. The upper and lower water drums are connected by water tubes of unusual construction and arrangement, and there are other special features, in addition to the feed-water heater, with its connections. Fig. 1 gives an external view of the boiler and Fig. 2 a vertical section showing the relation of parts. The lower drum 1 consists of a vertical cylinder having a central opening, of the shape of a frustum of a cone, forming part of the combustion chamber 14. A manhole 4 is provided in one side of the drum and extends horizontally through a surrounding brick casement 5.

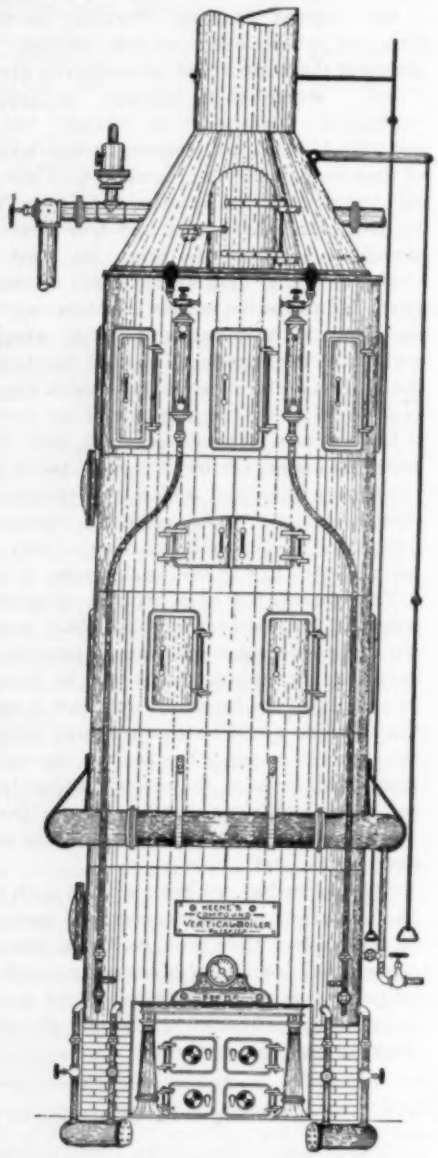


FIG. 1.

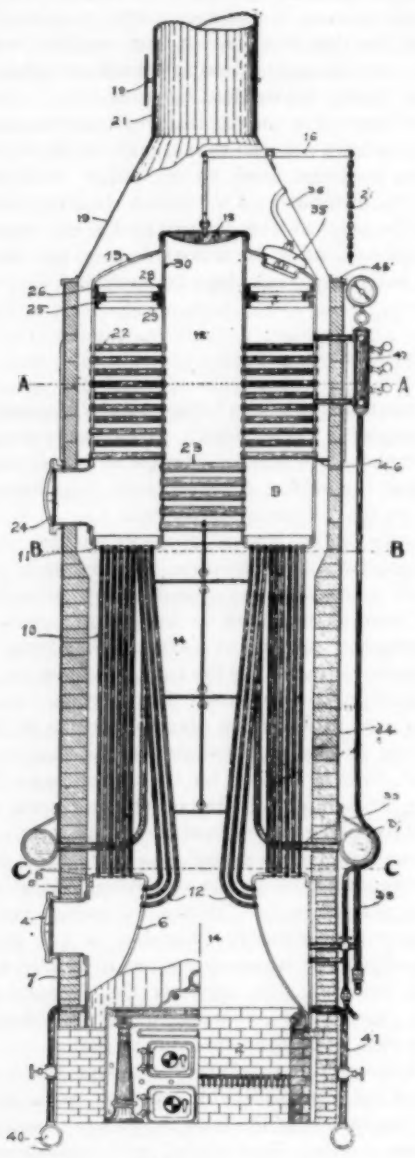


FIG. 2.

KEENE COMPOUND SAFETY WATER TUBE BOILER.

The inner plate 6 of the lower drum diverges downward and is united at the bottom with the outer sheet 7 to form the opening of the combustion-chamber 14, through which the products of combustion pass upward among the water and fire tubes. The top of the drum is covered by a horizontal flue-sheet 8. The upper water-drum 9 is also cylindrical and is connected with the lower drum by a plurality of vertical straight water-tubes 10, attached, respectively, to the top and bottom flue-sheets 8 and 11 of the two drums. An annular series of circulating water-tubes 12 extend from the inside sheet 6 of the drum 1 into the central opening 14, whence they are curved or bent upward, then slightly inclined outward until they enter the flue-sheet 11, forming the bottom of the upper water-drum 9. The bent or curved portions of these circulating flues lie directly in the path of the heat, which impinges upon them, intensely heating and driving the water within them rapidly upward, while the outer row of straight tubes 10, which are much cooler, will draw the water down into the lower drum, from which it is again sent upward through the circulating tubes 12. This arrangement produces circulation and prevents incrustation.

The upper water drum 9 contains a large central flue 12', which is directly above and coincident with the combustion chamber 14. The top 13 of the upper water drum is made removable in a manner described below. The central flue 12' is in direct open communication with the main combustion chamber, and its top is provided with a circular cast iron damper 15, convex on the under side and having an annular flange on its rim surrounding the extended top of the flue. This damper is raised and lowered by a lever 16, which passes out through the metal hood 19, which is its fulcrum, and its outer end is provided with a chain 20. Excessive heat within the generator can be reduced by raising the damper 15 and allowing the products of combustion to pass up directly through the central flue and out of the smoke stack 21. The central flue and the damper serve as a large man hole device, and access can be had to the upper water drum by removing the damper.

Horizontal radial fire tubes 22 are placed in the upper water drum, their opposite ends passing through the sides of the drum and central flue. Several layers of these fire tubes in the drum 9 are above the water line, and these superheat and dry the steam rising from the water in the upper drum. A group of slightly inclined circulating water tubes 23 is placed across the lower part of the flue 12' to increase the circulation of water. A man hole 24 is located in the side of the drum opposite these circulating tubes, and thus the tubes and interior of the drum are made accessible for repairs. The separ-

able top or section 13 of the upper water drum is of the same diameter as the drum, and is thus a prolongation of the latter. This top is tightly secured by a peculiar kind of flange joint consisting principally of four cast steel rings 25, 26, 28, 29. The outer or larger rings 25 and 26 seal the contiguous edges of the top and drum, and the smaller rings 28 and 29 encircle and connect and seal the contiguous edges of the flue 12. Each ring is L-shaped in cross section to provide laterally projecting flanges, which are fastened together with vertical bolts. The peripheries of the rings are attached to the contiguous edges of the top and drum by rivets. The adjoining sides of the rings are provided with an annular tongue and groove joint capable of receiving packing to make a steam-tight joint between the two rings.

By these means the top 13 may be readily separated from the drum to permit the latter to be opened wide for the removal or repair of any of the parts within. An additional man hole 35 is provided in the top 13 to gain access to the bolts which fasten the flanges together. Over the man hole there is a door in the hood above.

The feed water device consists of an annular header 37, which encircles the boiler setting or casement 5 at a point just above the top of the lower drum, water being supplied to this header through the pipe 38. Equi-distant radial water pipes 39 proceed from the header through he casement into the combustion chamber 14, whence they curve upward between the groups of vertical water tubes, terminating at the bottom flue sheet 11 of the upper water drum, into which they discharge. The capacity of the header 37 is equal to the combined capacity of all the ingoing feed water tubes 39, in order to insure an abundant supply, and the number comprising the latter will be equal to the number of spaces between the groups of water tubes connecting the lower and the upper water drums. A mud drum 40 encircles the lower part of the furnace and lies below the floor. Mud is discharged from the bottom of the lower drum 1 downward into this mud drum by means of the radial blow off pipes 41.

The casement around the furnace is composed of common brick, and above the top of the lower water drum it may be lined with fire brick. The casement around the boiler may be covered with a sheet iron jacket or left uncovered. The brick casement is capped by a ring 45, forming a base for the hood 19 to rest upon. The smoke pipe 21 contains a damper 19'. An upper deflector 46 encircles the outside of the upper water drum and closes the hot air space between the drum and the surrounding casement, thereby compelling the gases to escape through the fire tubes 22 by way of the central flue 12'. A vertical water column extends from the header of the heater 37 up to a water gauge 47, and horizontal pipes in connection with the water gauge extend into the upper water drum at points above and below the water line. Baffle plates hung from the lowest inclined water tube in the upper drum deflect the flame so that it passes around the vertical water tubes.

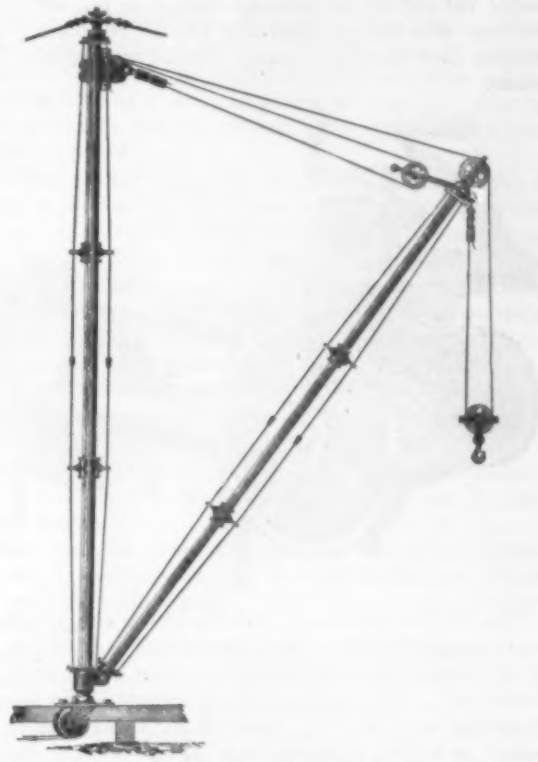
Some of the strong points of the Keene boiler as emphasized by the designer are simplicity, safety, portability, accessibility, quick generation of steam, convenience of cleaning, regulation of heat and production of dry steam. Small floor space is occupied. The boiler shown is of 250 h. p., designed for 150 pounds working pressure. It covers a floor space of 50 square feet, or a circle 8 feet in diameter, equivalent to 2-10 sq. ft. per horse power. The boiler is constructed of steel plates and tubes, and as a further guaranty of safety the inner surface of the lower drum curves outward. The general construction is such that all parts expand and contract alike. The drums are of such size that a man can work in them and the man holes on the side and in the top give access to the upper drum. If necessary the top of the upper drum can be removed. The large heating surface will be noted, and the rapid conduction of heat to the water through thecomparatively thin tube surface; at the same time there is prompt regulation of the heat. Estimates and specifications are furnished by Geo. J. Rockwell, 631 Washington Boulevard, Chicago.

It is stated that Julius Cosel, formerly of New Castle, Pa., has purchased land in Youngstown, O., on which to erect a boiler works.

The incorporation of the Spring Valley Furnace Co., Chicago, capital $20,000, is announced. The incorporators are W. O. Lindley, S. L. Adams and J. L. Fogle.

WROUGHT IRON TUBULAR DERRICK.

A patented derrick, built of wrought iron pipe, is manufactured by the Contractors' Plant Mfg. Co., Ltd., of Buffalo. It is designed with a study for simple construction, so that it can be readily taken apart, transported and erected. There are no threads on the pipe and the parts are not screwed together but held securely by means of clamps and trusses. The only tool necessary for erection is a wrench to screw up the bolts and draw up the trusses. The derrick shown is made to be operated by double drum steam or horse-power, with hoisting and boom lines leading up to the top of the mast. Another of similar appearance is made for operation



by a double drum hand power. The shears are arranged to avoid chafing between the two lines, and the sheave at the point of the boom is placed to give the greatest sweep to the derrick, the load being centered on the steel pin holding the sheave. The capacity of these machines ranges from 5 to 15 tons. The lines of manufacture in which the Contractors' Plant Mfg. Co. has been engaged for 20 years include miners' whims, derricks, wrought iron and steel tackle and cable blocks, iron sheaves with or without self-lubricating phosphor bronze bushings, road scrapers and rollers, cable and iron guy rope, steam and hand cranes.

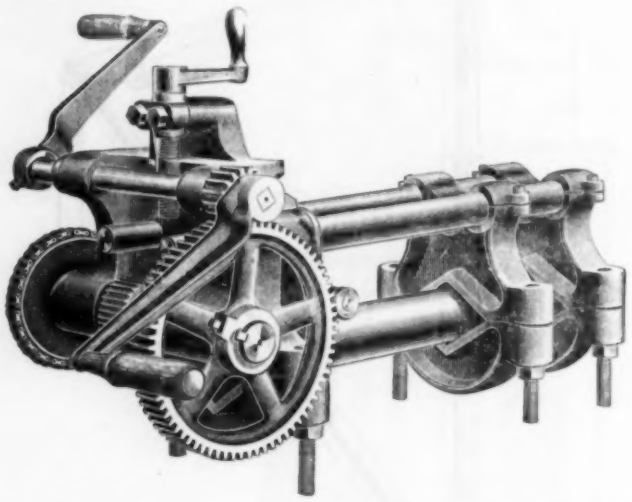
Pop-Gates for Castings.

In a recent issue of the *Iron Molders' Journal*, R. D. Moore contributed an article on the proper making and use of pop-gates making these points in substance: The pop-gate should be so tapered that it will break off just at the casting, leaving the least possible scar. Hard ramming around gates causes the iron to boil, and makes dirty castings. Pouring gates, if made small, round, and set close to mold cavity will skim the iron well, and will act excellently as a feeder. In commenting on the above the *Journal* of the American Foundrymen's Association says: "We take exception to Mr. Moore's assertion that a small gate is a good skimmer. In a small gate, the downfalling stream will force the dirt into the mold, while in a large gate, the dross will escape to one side, and float in the gate, leaving ample room for the passage of the iron without its being carried along with it."

An order for 40,000 tons of American rails has been placed by Cape Colony interests, it is stated, at 20 per cent under English quotations. A large order for tubing has come to the United States which was, it is alleged refused by a firm in Scotland, the American company complying with the customer's demand for longer lengths. The two orders amounted, it is stated, to $2,500,000.

PORTABLE SHAFT KEYSEATER.

A new machine has been brought out recently by John T. Burr & Son, of Brooklyn—their No. 2 portable shaft keyseater. This combines all of the features of their No. 1 machine with increased capacity, power and stiffness. It is geared somewhat higher and is provided with two cranks instead of one. It will mill keyseats on the end or in the middle of shafts up to 8 inches diameter and will cut 12 inches without resetting. By sliding the machine along after each 12 inches is milled, keyseats of any length may be cut. Keyseats as large as 2 inches wide by 1 inch deep may be cut accurately and efficiently on this machine, the sliding support under the cutters eliminating chatter or jar, and producing keyseats with straight sides and smooth bottoms. It may be slipped over shafting already erected or used as a shop machine.



The feed is automatic, but the worm may be disengaged and the machine fed by hand should this be desirable. It can be furnished with flexible shaft or other power drive at additional cost. The regular outfit of cutters is the same as that furnished with the No. 1 machine, by using one or more of which at a time, keyseats from ¼ inch to 1¼ inches wide may be milled. For wider cuts the mills should be same width as the keyseat and should have spiral teeth. These wider cutters must be of larger diameter than those of the regular outfit, so that the proper depth can be reached. Standard cutters with 1-inch hole may be used.

Pulley Manufacturers in Conference.

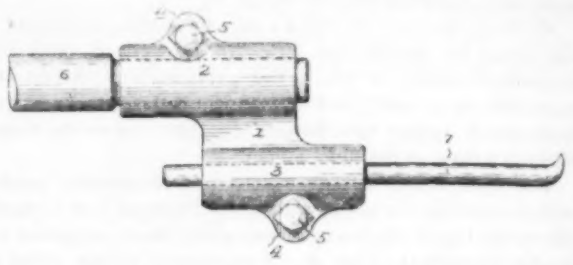
The pulley manufacturers of the country have been in conference recently with a view to getting the trade on a better basis. The Reeves Pulley Co., Columbus, Ind.; Keasey Pulley Co., Toledo, O.; Dodge Mfg. Co., Mishawaka, Ind.; Menasha Pulley Co., Menasha, Wis.; Saginaw Mfg. Co., Saginaw, Mich.; Valley Pulley Co., Maysville, Ky.; Buckeye Pulley Co., Marion, O., and the Fulton Pulley Co., Fulton, N. Y., have been represented. The telegraphic reports that a consolidation is aimed at are untrue. Such a move may be made in this trade, in the course of time, but it is not now under consideration. The objects sought are the adoption of uniform lists, so that discounts will be intelligible, and a change in the classification of pulleys by the railroads. They are now put in first class, whereas manufacturers contend that they should be in third or fifth class. Progress has been made in the meetings so far held, and it is expected they will result in greater uniformity.

THE American Pig Iron Storage Warrant Co.'s stocks in yard on March 31 were 109,700 tons, the withdrawals in the preceding 11 days being 6,800 tons, while 100 tons was put in yard. The net stock in yard March 31, 1898, was 283,250 tons, showing a decrease of about 175,000 tons in the year.

THE Glamorgan Pipe & Foundry Co., of Glamorgan, Va., has been sold to a party of New York capitalists. The Consolidated barb wire plant at Leavenworth, Kas., has been closed down by the purchasers, the American Steel & Wire Co.

A NEW TOOL-HOLDER.

A tool-holder patented by Enoch Hughes, of Akron, O., is being manufactured for the machine shop trade by Francis H. Smith, of Akron. A view of it is given in the cut below, showing the holder in operative relation. The clamps 2 and 3 are at opposite ends of the body and in parallel relation. They are in the form of longitudinally split sleeves, having offstanding ears 4 which are apertured to receive the bolts 5, by means of which the clamps are contracted so as to grip the tool and the tool post, as required. The clamps are of different diameters and are longer than the stock, so that there may be no slipping of the holder upon the tool-post or



of the tool within the holder. The holder is designed for use in lathe-work and can be used with drill presses, shapers, and with boring and threading tools. It is constructed so that the tool may be raised or lowered without disturbing its parallel relation with its normal position. By providing interchangeable heads a boring tool can be substituted for a threading tool and *vice versa* without altering either the length of the tool or the stem in the post. For heavy work the holders may be duplicated and placed upon opposite ends of the tool post, to provide a double bearing for the tool.

Received From the Trade.

Catalogue No. 25, of the H. W. Caldwell & Son Co., Chicago, embodies the results of the notable advance made in the past 25 years in the application of the spiral or screw conveyor to the carrying materials. In 1874 H. W. Caldwell devoted himself to the development of spiral conveyors. The invention of the Caldwell flight came first—the flight being formed from a disc of metal into a spiral extending more than one revolution of the shaft, thus giving a conveyor with comparatively few rivets and laps. Then came the spiral conveyor with flights of a single strip of metal without laps or rivets. This was embodied in the Caldwell helicoid conveyor, the invention of F. C. Caldwell. This is described in detail in the catalogue before us. The original Caldwell flight was a slotted disc stamped out of sheet metal, and having a hole in the centre. This was given the spiral form under heavy pressure. The illustrations, descriptions and details of sizes and adaptations take up 380 catalogue pages. In addition to elevating and conveying machinery, considerable space is given to power transmission equipment.

A handy shop catalogue 4¼x6½ inches, 388 pages, has been published recently by the American Tool Works Co., Cincinnati. Beginning with the company's 60-inch standard engine lathe, the whole line of its machinery is illustrated, the cut appearing on one page and the description on the opposite page. Milling machines, planers, shapers, drill presses, radial drills, and screw machines are the leading lines. Bolt cutters, grinding and polishing machines, punches and shears are also represented. In the concluding pages, gauge, weight and other tables are given, together with brief shop hints.

A characteristically well made catalogue comes from the B. F. Sturtevant Co., of Boston, and treats of the Sturtevant steel plate steam, pulley and electric fans. The Sturtevant steel plate fan is constantly getting wider recognition as the type for all general purposes of ventilation, heating and mechanical draft. The catalogue devotes 130 pages to the various styles and sizes of these fans and gives tables pertaining to their operation.

Fannie Furnace, at West Middlesex, Pa., idle since 1896, is being repaired and will be ready for blast in May. It will be operated by the Reed Furnace Co., recently organized. The stack has a daily capacity of about 150 tons.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market, and Some of Their Wants:—

The new lessee of the Cumberland Rolling Mills at Cumberland, Md., will be known as the Potomac Steel Co. The mills will soon be in operation. New boilers, heating furnaces and rolls will be installed at once.

The Eckel Bros. Steel Co. is the name of a new corporation at Syracuse, N. Y. The officers of the company have been in steel manufacture for many years, Peter Eckel as manager of Sweet's Steel Co. and F. H. Nye as secretary and treasurer. The plant will be modern and the product will be blister steel worked into bars, tire and spring steel, etc.

The National Machine & Tool Co., of Portland, Me., has been incorporated, with a capital of $50,000, by James H. Reed, Alfred L. Barrett, Brookline, Mass.; Heber C. Peter, Dorchester, Mass.; Henry C. Peabody, Portland.

At Halifax, N S., a newly organized steel and iron company, composed of H. F. Dimock and Almeric Paget, of New York, and others, interested in the Dominion Coal Co., is said to have received an important government coal concession on condition that a $3,000,000 plant be erected.

The Cleveland Car Co., 148 to 152 Scranton ave., Cleveland, has been organized to build light steel cars, portable railways, rolling stock and accessories. The company reports orders amounting to over $5,000 in the first month. J. W. Hornsey is manager.

It is reported that at its Washburn & Moen plant, the American Steel Wire Co. will erect an independent open-hearth steel plant at Quinsigamond, Worcester, Mass., to produce all the steel required by the Worcester works.

Articles of incorporation of the Eclipse Foundry Co., Belleville, Ill., were filed last week. The capital stock is $6,000, and the incorporators are H. W. Lengfelder, Leohnard Meyer, H. C. Bodmann and Ben. Taylor.

The Penn Spring Works, of Baldwinsville, N. Y., has been incorporated to manufacture springs for vehicles and locomotives, capital $28,500. Directors, Agnes C. Penn, Ada K. Penn, F. W. Penn, Thomas Merriam and Joseph Bondy, of Syracuse.

Henry E. Pridmore, No. 111 W. Harrison st., Chicago, Ill., will buy a large planer, a turning mill and other tools, and for his new foundry a cupola, blower, tumblers, etc.

The Potomac Steel Co., which is to start up the mill at Cumberland, Md., will buy some small engines and 500 horse power of boilers. T. S. B. Wood is superintendent.

The Gray Iron Casting Co., Ltd., Mount Joy, Pa., will be in the market for foundry equipment to replace that which was burned two weeks ago.

C. F. Moon, Greensboro, N. C., is in the market for a new or second-hand foot or power screw-cutting engine lathe, swing 10 x 12 or 13-inch.

The Fairview Mfg. Co., recently incorporated by T. T. Wood, of Racine, and James Crook and Wm. Cowell, has bought a plant at Fairview, Ill., formerly occupied by a pulley works, and will manufacture malleable iron and brass novelties. Mr. Wood has had long experience in malleable work, having been connected with the plant at Racine.

The American Shovel & Stamping Co. has been incorporated at Chicago (capital stock, $100,000) by R. T. J. Martin, A. W. Underwood, Thomas H. Martin.

The Forged Steel Joint Co., of New York City, capital $100,000, has been incorporated. Directors: Herbert R. Keithley and Murray Corrington, of New York, and Menard K. Bowen, of Chicago.

New Construction:—

The Shaw Electric Crane Co. of Muskegon, Mich., which recently erected a large addition to its plant, is preparing further improvements which will double its size.

The Mercer Machine & Steel Casting Works is the name of a new company in Mercer, Pa., formed by G. S. and W. W. Humes and G. Z. Sheriff. The main building will be two stories high and all buildings will be constructed of corrugated iron or steel.

The Jeffrey Mfg. Co. of Columbus, O., will erect a new foundry which will contain two cupolas.

The Lancaster Machine & Knife Works, of Lancaster, N. Y., will rebuild on a larger scale their plant recently destroyed by fire.

Wickes Bros., of Saginaw, Mich., contemplate the erection of a new boiler shop. The National Wire Co., of New Haven, Conn., which recently acquired the plant of the New Haven Wire Mfg. Co., is proposing the erection of a large addition.

The Granite City Steel Works, Granite City, Ill., have begun the construction of eight new sheet mills.

The Troy (N Y.) Malleable Iron Works are to build an addition to the present foundry, 300 x 70 feet; estimated cost, $25,000. M. F. Cummings & Son, are architects, Times Bldg., Troy.

Pawling & Harnischfeger, Milwaukee, Wis., are building an additional erecting floor and machine shop, to provide increased facilities for the manufacture of traveling cranes. The building will be a brick structure, 50 x 125 feet, consisting of three stories and a basement. The report as to a new foundry is incorrect.

The Union Steam Pump Co., of Battle Creek, Mich., is extending its works, the old offices being added on to the shops, and an extension being made to the machine shop. The new office building is of brick, two stories high. The test rooms will be at the end of the shop near the railway tracks, so that completed pumps can be conveniently tested before shipment. The company has equipped its boilers with mechanical stokers.

The Fosdick & Holloway Machine Tool Co., Cincinnati, will erect a two-story plant 312 x 175 feet. The equipment includes two boilers and one engine.

J. H. Clauss & Co., Fremont, O., will build a three-story addition to their shear works. N. Voss, of Fremont, O., has the general contract.

An Allentown, Pa., dispatch says that the Midvale Steel Co. has about completed a deal for land on the outskirts of the city, and will build a plant. The report is not officially confirmed as yet.

The contract for the new stove works plant at Keokuk, Ia., was let last week by Col. C. H. Castle to McCutcheon, Neil & McCutcheon. The foundry proper will be 104 x 108 feet.

The Columbia Foundry & Machine Co., St. Joseph, Mo., will build a new foundry, which will be provided with the most modern equipment.

Parties are in correspondence with Mayor Stallcup of Maysville, Ky., relative to the establishment of stove and range works in Maysville to employ about 60 men.

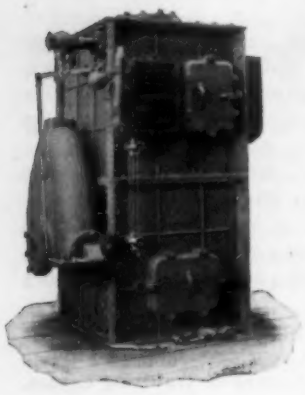
The Louisville & Nashville Railroad Co. has let contract to Cook & Lowrie of Montgomery, Ala., for the enlargement of its shops at Decatur, Ala., which will double their present capacity.

Power Equipment and Machine Tools.

The Grant Machine Tool Works, of Cleveland, have commenced to run 22 hours a day, in order to keep up with their orders for machine tools. In addition to their milling machines, semi-radial drills, hand lathes, special piston ring and cylinder head lathes, recently referred to in these columns, they are building a 42-inch boring mill, 16 inch taper turning lathe, and a special automatic worm gear cutter.

The Cambridge (O.) Engine & Pump Co. has been incorporated with $30,000 capital stock.

At the recent meeting of the board of directors of the Pratt & Whitney Co., at Hartford, Conn., the following officers were elected: Amos Whitney, president; Rowland Swift, vice-president; Roswell F. Blodgett, secretary, and J. C. Stirling, treasurer. The office of the second vice-president, lately held by George W. M. Reed, was not filled. The same men who constituted the executive board last year were re-elected. Previous to the directors' meeting a meeting of the stockholders took place, which was largely attended, 15,000 shares of capital stock being represented. The treasurer's report showed that the sales for the past year amounted to $1,315,603.10, a net profit for the year of $82,940.71. The following are the directors for the coming year: Francis A. Pratt, Amos Whitney, Roswell F. Blodgett, Rowland Swift, William Waldo Hyde, J. R. Refield, George W. M. Reed, Frank C. Sumner, Daniel R. Howe, of Hartford; C. C. Cuyler, A. C. Vaughn and Robert S. Walker, of New York, and T. J.



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Mfrs. of the Cochrane Separators.

Nicholl, of Rochester. Mr. Nicholl, who is the new managing director, succeeds Gen. H. J. Morse, of New York.

The Pittsburg District:—

Laughlin & Co., Ltd., Pittsburg, have purchased the six acres on which the old Linden Steel Works stood, for about $70,000. The property fronts on Second ave., and will be used as an addition to the furnace yards.

L. T. Brown, superintendent of the 33rd st., or Upper Union Mill of the Carnegie Steel Co., Ltd., gave a banquet to about 150 of the employes last Saturday in honor of the tonnage record made during March, the product being 20,561 tons and the shipments 20,675 tons. President C. M. Schwab told the men that the record had been made with practically the same facilities that were at command eight years ago, when 8,000 tons a month was considered a good showing, and stated that if the record were ever equalled or excelled a larger banquet might be looked for.

The National Steel Co. has made a 10 per cent advance in the wages in the Sharon, Pa., plant, formerly owned by the Buhl Steel Co.

Furnace A, of the Carnegie Steel Co.'s nine furnaces at Braddock, was blown in last week and made its first cast about the end of the week. The furnace will be run on Bessemer for a while only, its usual product being ferro-manganese. The furnace has undergone extensive improvements.

A small strike occurred at the Carrie furnaces of the Carnegie Steel Co. last week, the ore handlers and buggy pullers claiming that four men were on work at which there were six at the Edgar Thomson furnaces. After a short idleness additional help was given and the men returned to work.

The Pittsburg Steel Foundry Co., recently chartered, has secured a tract of 12 acres of land at Glassport, Pa., and will erect a steel casting plant containing three acid and one basic open-hearth furnace, each with 20 tons capacity. There will be 10 cranes ranging from 10 to 60 tons capacity. Ground is to be broken at once, and it is expected the plant will be in operation by August 1. The company is capitalized at $250,000, all of which is paid in, and may increase to $500,000. The following board of directors has been elected: Wallace H. Rowe, general manager of the American Steel & Wire Co.; J. M. Lockhart; James J. Donnell, of the banking firm of N. Holmes & Son; William McKelvy, president of the Atlantic Refining Co., and Stewart Johnston, who has just resigned the position of general superintendent of the American Steel Casting Co., and who will be manager of the new plant. He was president of the Pittsburg Steel Casting Co. when it was taken into the steel casting combine. A number of prominent Pittsburg business men are interested in the company besides the directorate.

As has been forecast, the Schultz Bridge & Iron Co., McKee's Rocks, Pa., by a doubling of the capital stock from $250,000 to $500,000, will include the two projects recently formed of building steel coal barges and installing and operating a system of steel ferryboats for freight across the Ohio river at McKee's Rocks. The former project is fathered by Capt. S. S. Brown, the coal operator, and in the latter are a number of officials of the Pressed Steel Car Co., which has a plant on the east side of the river at that point, and is building one on the west side. It is to be decided this week whether or not a new charter will be secured for the Schultz Bridge & Iron Co. The increase of $250,000 in the capital stock has already been subscribed for Neville Island residents have offered 10 acres and $10,000 bonus to locate the new plant on the island, near McKees Rocks.

Owen Shukey, of Braddock, Pa., is reported to be at the head of a project to build at that place a wire nail mill.

The Pittsburg Reduction Co. has received an order for 100,000 pounds of aluminum from the Japanese government, for use in the manufacture of rapid fire shells and for army equipment.

The Seaman-Sleeth Co., Pittsburg, operating the Phœnix Roll Works, advanced the wages of its employes last week 10 per cent, the men knowing nothing of the advance until they received the increased pay.

H. M. Brackenridge and J. W. Hemphill, of Tarentum, Pa., last week purchased the 60-acre tract of land formerly occupied by the Standard Oil refinery at Hite's Station, across

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FOR RIVETING · CHIPPING
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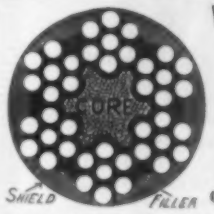
CHILLED AND HARD GUIDES A SPECIALTY.



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Elevators and Conveyors, Detachable Sprocket Chain, Sprocket Wheels.

DETROIT SPROCKET CHAIN CO., Ltd., DETROIT, MICH.

WRITE FOR NEW CATALOGUE.

the Allegheny river from New Kensington. It is rumored that a rolling mill is contemplated.

Owing to a change in the plans, the limited partnership mentioned last week, formed under the name of the Pittsburg Steel Casting Co., Ltd., will be changed to a corporation, application having been made for a Pennsylvania charter, the name being the Union Steel Casting Co. The company has a paid-up capital stock of $70,000 and will proceed at once to the erection of an open-hearth steel casting plant on a plot of ground 4½ acres in extent in the city of Pittsburg, on Butler street, close to the bridge crossing the Allegheny river to Sharpsburg. The directors are Charles D. Marshall, chairman; C. C. Smith, secretary; Uriah Tinker, treasurer; Joseph G. Wainwright and George W. Eisenbeis. A 15-ton acid open-hearth furnace will be erected and general castings made. The projectors are very fortunate in having contracted, over two months ago, for enough low phosphorus pig iron to operate the plant from its start until the beginning of next year at a price several dollars a ton below the present market rate. The main building will be 125 x 240 feet, with a producer building 50 x 100 feet. The Shiffler Bridge Co., of which Mr. Marshall, the chairman of the company, is secretary, has the contract for the buildings. Contracts for a 20- and a 10 ton crane have been let to the Morgan Engineering Co., Alliance, O., but the concern is still in the market for a quantity of the minor machinery. A temporary office is located in the Fisk Telephone Exchange Bldg., Butler and Fisk sts., Pittsburg.

Zug & Co., Pittsburg, have given the day men and laborers in their mill an advance in wages ranging from 5 to 10 per cent.

It is reported that a project has been set on foot by W. P. Tyler of the Tyler Tube & Pipe Co., Washington, Pa., who have for a long time manufactured charcoal skelp iron for their tube works, to erect a mill at Washington to make Charcoal iron sheets for tin plate. Associated with Mr. Tyler are P. J. McNulty, of Pittsburg, and N. R. Baker, of Washington. There has always been a certain demand among old roofers and tinners for genuine charcoal iron roofing plates, but those who have tried the experiment of manufacturing

U. BAIRD MACHINERY CO.,

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Machine Tools and Supplies. Send for list of Second-hand Tools.

P & B Ruberoid Roofing

For covering buildings exposed to severe conditions, such as machine shops, foundries, etc. No paper to tear. No tar to run or melt. Absolutely the best. Has as a foundation the best wool felt. Not affected by acids, alkalies, coal-gas, steam, oil, grease or by great heat. Waterproof. Durable. Easily laid. . . . . .

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Ore and Coal Handling Machinery

For Blast Furnaces, Docks and Mines.

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the material have always found that a price could not be secured to justify the large extra expense of the charcoal iron as a base, and the extra cost of coating it, caused by the large proportion of wasters.

A large mass meeting will be held by the members of the Amalgamated Association in the first district, of which Pittsburg is the center, in the latter part of April. It will be the last meeting before the annual convention.

Several of the mills in the 30-mill tin plate plant at New Castle, Pa., of the American Tin Plate Co., were started in operation Wednesday and Thursday of last week for the first time, and gradually the whole plant will be put in operation. The tin house will not be started at once.

The Chicago District:

Spring Valley furnace, Spring Valley, Wis., has been leased by the Spring Valley Furnace Co. and will be put in blast about May 15 on coke iron, using brown hematite ores mined at the furnace. Pickands, Brown & Co., The Rookery, Chicago, are the selling agents.

The Mesta Machine Co., Pittsburg, has sold through its Chicago agents, E. M. Hagar & Co., The Rookery, a No. 5 Mesta shear for cutting 100-lb. steel rails to the new Chicago plant of the Griffin Wheel Co. This shear weighs 50 tons and is the largest in this section of the country.

H. E. Pridmore, manufacturer of the Pridmore molding machines, will erect a plant at the corner of Rockwell st., 19th st. and the Burlington Railroad, Chicago, as noted recently in these columns. The machine shop will be two stories high, 60 x 100 feet in size. The foundry will be one story, 60 x 150 feet. Both buildings will be of brick and steel. The plant is so located that it can be enlarged to meet almost any requirements. Mr. Pridmore's business has increased very largely in the past three years and the present plant, at 111 and 113 West Harrison st., is entirely inadequate to take care of the business.

The David Bradley Mfg. Co., 63 N. Desplaines st., Chicago, is in the market for a planer, 24 x 24 inches by 6 feet; a lathe, 20 inches swing, and 6 feet between centers, and a universal saw.

The property, assets and plant of the Pullman Iron & Steel Co., at Pullman, Chicago, are offered for sale. Particulars are to be had of the secretary of the company, 6 Adams st, Chicago. The property will be sold at 11 A. M., May 10, at public auction, at the office of the company at Pullman. A stockholders' ratificaton meeting will be held April 28.

Morgan Construction Co., of Worcester, Mass., has recently closed a contract for the installation of a Morgan continuous rod mill of its latest type, for the Grand Crossing Tack Co., of Chicago.

The W. A. Jones Foundry & Machine Co., Chicago, is running night and day, and is not only full of domestic orders,

EDWIN HARRINGTON, SON & CO., Inc.,

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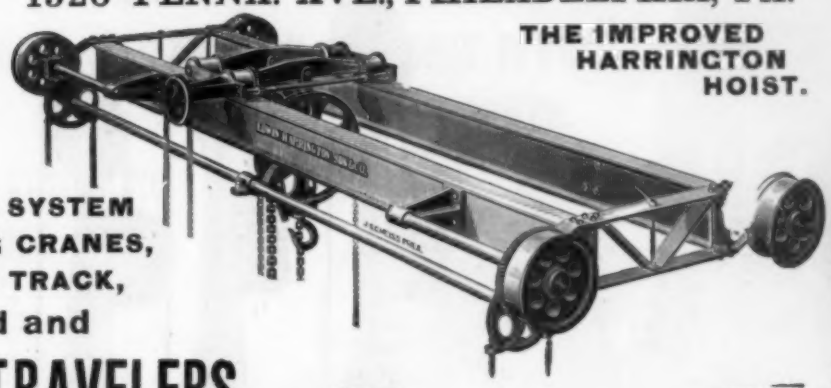

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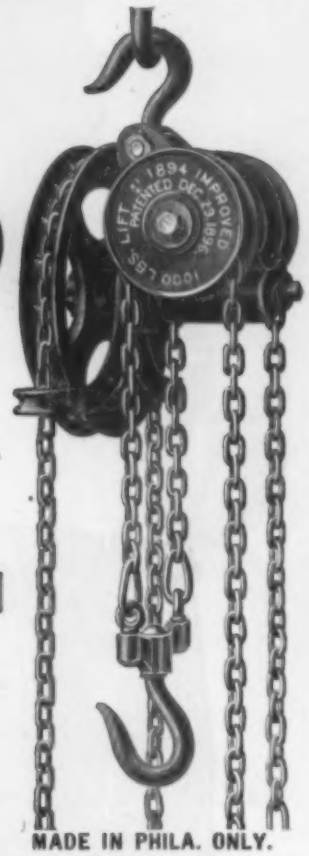

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PLAIN TRAVELERS,

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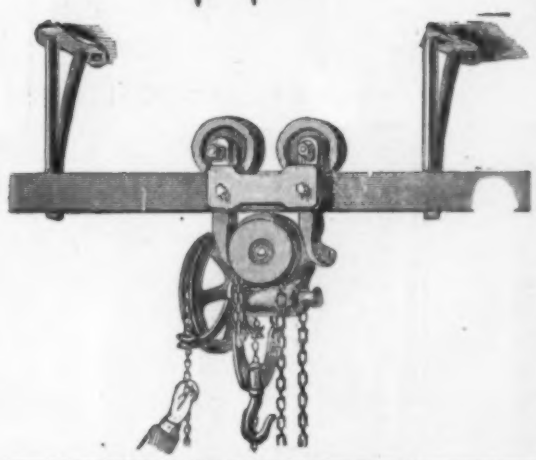

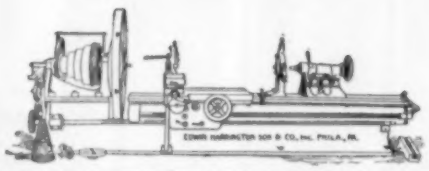

MADE IN PHILA. ONLY.

but has lately received a large inquiry from abroad. Shafting, hangers, pulleys and belting are going into all kinds of plants, new and old.

The Q. & C. Co., Chicago, reports a large shipment of pneumatic tools to St. Petersburg, Russia, where an agency has been established.

The A. Plamondon Mfg. Co., Chicago, reports business booming. The company is running full time and has many orders ahead.

General Industrial Notes:—

The Ellis & Lessig Steel & Iron Co., at Potstown, Pa., announced an increase in wages April 1. On May 1 a further increase will go into effect.

The blast furnace of the Carbon Iron & Steel Co. at Parryville, Pa., was blown in March 27.

The William Tod Co., of Youngstown, O., has incorporated to manufacture all kinds of machinery and engines, and the company is authorized to do business on $300,000 capital stock.

The Goodsell Iron Works at Ludington, Mich., have closed down. The stock, machinery and fixtures were sold to Wickes Bros., of Saginaw.

The M. Steele Co., of Springfield, O., has sold its plant to the Amercian Radiator Co., of Chicago.

A deal is pending for the purchase of the plant of the Klotz & Kromer Co., of Sandusky. If consummated, the business and plant will be increased largely.

Midland, Ont., grants a bonus of $50,000 to the Canada Furnace Co., of Montreal, for the establishment of a charcoal iron furnace.

Beginning with May 1, union machinery molders at Detroit will be given an advance of 10 per cent. Those earning $2.50 a day or less will be affected.

The property of the Rome (Ga.) Furnace & Iron Co. was sold March 27 and it was bid in by the bondholders for $20,000. The company will reorganize and the furnace will probably go in blast soon.

A conference between the Wheeling Steel & Iron Co., Wheeling, W. Va., and its employes last week settled the new scale on the basis of an advance of 8 to 15per cent.

Aurora Furnace at Wrightsville, Pa., is expected to start up after being idle a year.

At Johnstown, Pa., it is announced that the Cambria Iron Co. will make improvements to its works during the coming summer, to cost about $1,000,000. The last pay roll for two weeks amounted to $175,000, the largest in the history of the company.

It is probable that Kirtland Furnace at Kirtland, N. Y., will be started up by the Franklin Iron Works Mfg. Co. It has been idle since 1890.

Merchant & Co., Inc., of Philadelphia, New York and Chicago, recently received an order from the War Department for 786 of their galvanized "Star" ventilators, for use on the officers quarters and barracks to be erected at Havana and Matanzas, Cuba. There will be 587 Star ventilators of 24 inches diameter and 199 of 14 inches diameter. If these ventilators were placed in a line with their edges touching they would cover a distance of nearly half a mile. Within the last few months Merchant & Co., Inc., have also supplied 500 18-inch ventilators for the new Government hospitals at Fortress Monroe and Savannah.

It is announced that the Detroit Steel & Spring Co. has given an option on its plant to Charles L. Freer, who has just formed the car supply company with $50,000,000 capitalization. The plant covers ten acres and employes 1,500 men. The capital stock of $250,000 is all paid in and the company owns $350,000 worth of property.

In connection with the distribution at Sharon, Pa., of the cash portion of the payment to stockholders of the Buhl Steel Co., for their interests, transferred to the National Steel Co., it is stated that the stock was taken on the basis of 150.

Princess Furnace, Glen Wilton, Va., will blow out next week for repairs. It is the intention of the company to blow in again as soon as possible, probably in 10 days after blowing out.

Metallurgical Furnaces

We design and build Metal Working Furnaces for every purpose, using any fuel.

We manufacture and install the most modern appliances for burning fuel oil.

Satisfactory operation guaranteed.

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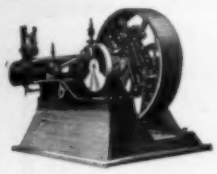

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10 to 125 HORSE POWER.

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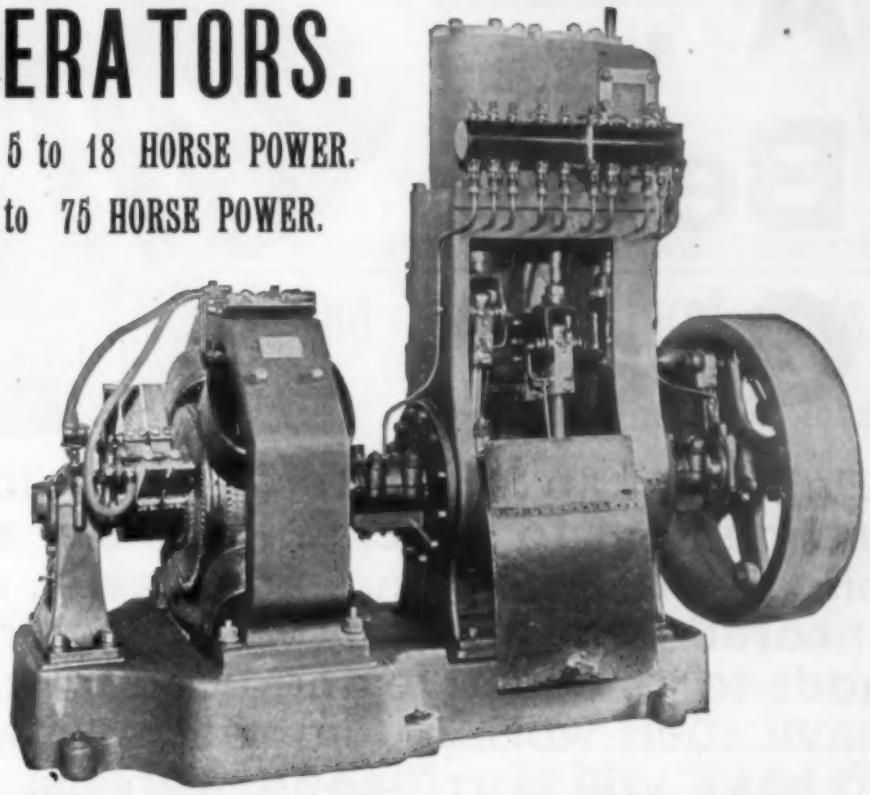

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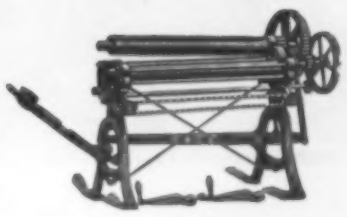

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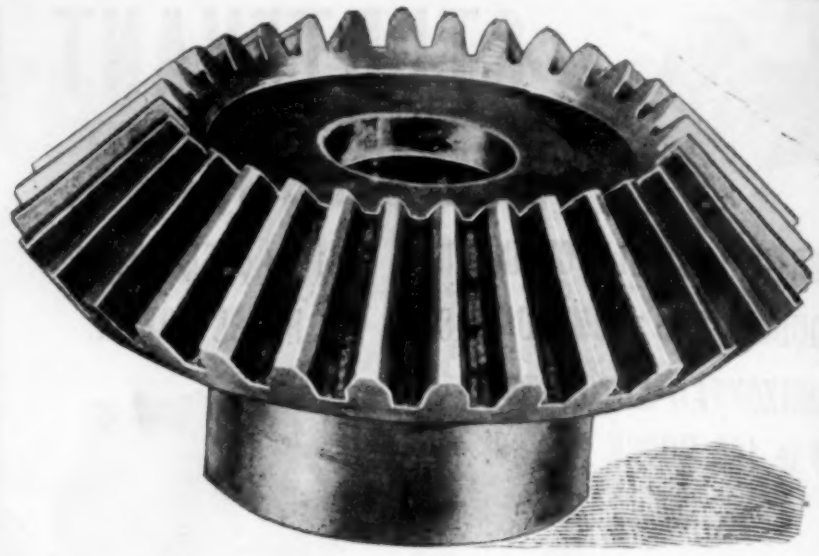

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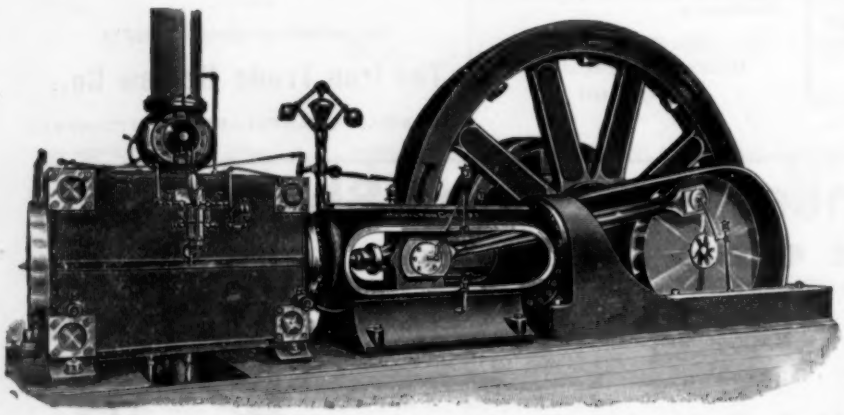

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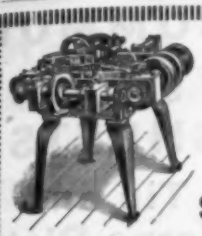

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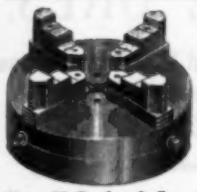

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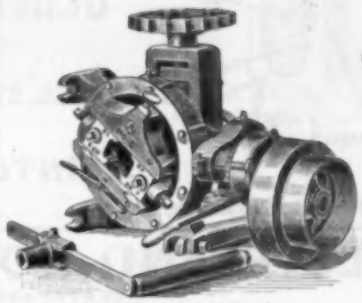

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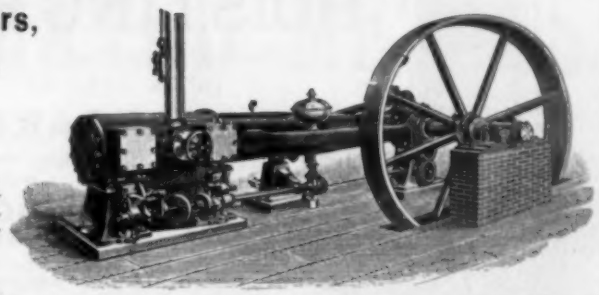

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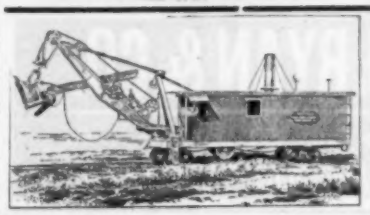

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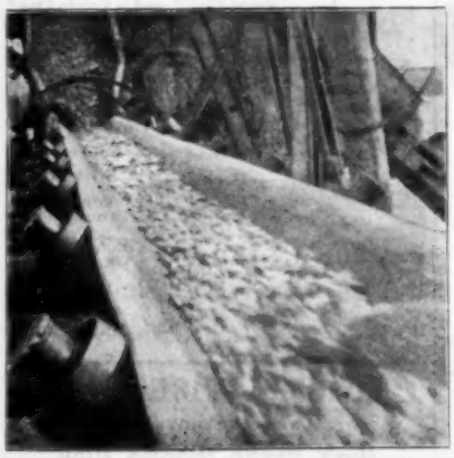

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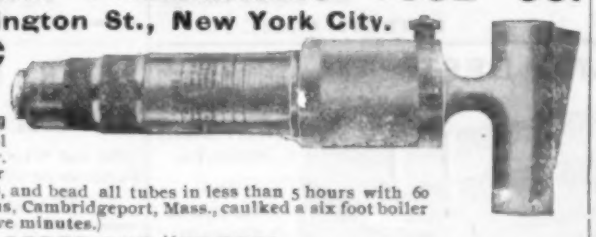

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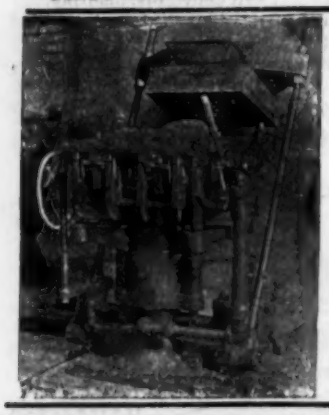

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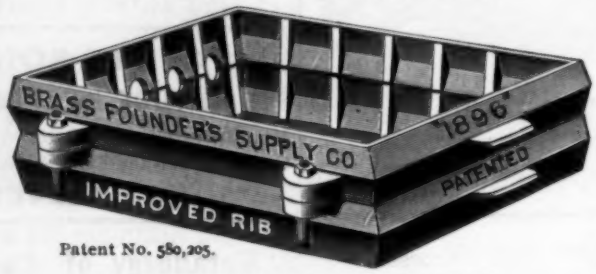

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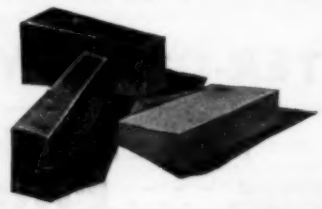

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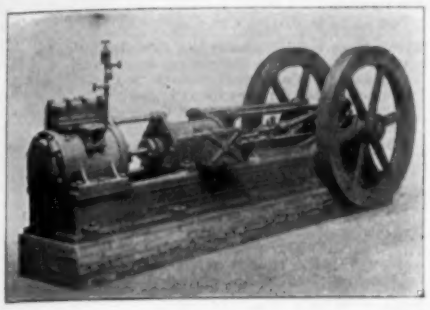

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Columbia Fire Clay Co., Cleveland, O.
Vulcan Mfg. Co., Pittsburg, Pa.
Scioto Star Fire Brick Works, Portsmouth, O.
Kentucky Fire Brick Works, Portsmouth, O.
Webster Fire Brick Co., South Webster, O.
Ætna Fire Brick Co., Oak Hill, O.
J. V. Rose, Sharon, Pa.
Oak Hill Fire Brick & Coal Co., Oak Hill, O.
Holmes, Strachan & Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.
Foundry Facings—
The S. Obermayer Co., Cincinnati, O.
Cleveland Facing Mill Co., Cleveland, O.
Forgings—
Cleveland City Forge & Iron Co., Cleveland, O.
Bethlehem Iron Co., South Bethlehem, Pa.
Braeburn Steel Co., Braeburn, Pa.
Wyman & Gordon, Worchester, Mass.
Friction Metal—
C. H. Besly & Co., Chicago, Ill.
Swarts Metal Refining Co., Chicago, Ill.
Perfect Lubricating Metal Co., Cincinnati, O.
Furnaces—
Brightman Furnace Co., Cleveland, O.
Playford Stoker Co., Cleveland, O.
Furnace Linings—
Union Mining Co., Mt. Savage, Md.
Fuel Oil Burners—
W. S. Rockwell & Co., New York City.
American Gas Furnace Co., New York City.
Galvanized Iron—
Apollo Iron & Steel Co., Pittsburg, Pa.
Galvanizers—
Ætna-Standard Iron & Steel Co., Bridgeport, O.
Apollo Iron & Steel Co., Pittsburg, Pa.
Galvanizing Pots—
The Wm. B. Pollock Co., Youngstown, O.
Gas Burners—
American Gas Furnace Co., New York City.
Gas Furnaces—
American Gas Furnace Co., New York City.
Gearing.
I. & E. Greenwald Co., Cincinnati, O.
Gear Cutting—
The R. D. Nuttall Co., Allegheny, Pa.
Brainard Milling Machine Co., Hyde Park, Mass.
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Gear Cutters—
Brainard Milling Machine Co., Hyde Park, Mass.
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The Ironsides Company, Columbus, O.
Grindstones—
C. H. Besly & Co., Chicago, Ill.
Graphite Paint—
Jos. Dixon Crucible Co., Jersey City N. J.,
Grate Bars—
Geo. B. Sennett Co., Youngstown, Ohio.
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W. A. Jones Foundry Co., Chicago, Ill.
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Covert Mfg. Co., West Troy, N. Y.
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Edwin Harrington Son & Co., Philadelphia.
Reading Crane & Hoist Works, Reading, Pa.
The Lane & Bodley Co., Cincinnati, O.
The Aultman Co., Canton, O.
Lidgerwood Mfg. Co., New York City.
Heaters and Purifiers—
Harrison Safety Boiler Works, Philadelphia.
Stilwell-Bierce & Smith-Vaile Co., Dayton O.
Heating and Ventilating Apparatus
B. F. Sturtevant Co., Boston.
Heavy Hardware—
C. H. Besly & Co., Chicago, Ill.
Parkhurst & Wilkinson Co., Chicago, Ill.
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Earle C. Bacon, New York City.
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Lidgerwood Mfg. Co., New York City.
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Hoisting Machinery—
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Reading Crane & Hoist Works, Reading, Pa.
Jeffrey Mfg. Co., Columbus, O.
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S. Obermayer Co., Cincinnati, O.
Garden City Sand Co., Chicago, Ill.
Newport Sand Bank Co., Newport, Ky.
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C. H. Besly & Co., Chicago, Ill.
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Forster, Waterbury & Co., Chicago, Ill.
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Superior Charcoal Iron Co., Grand Rapids, Mich
Hickman & Williams, Chicago, Ill.
Spearman Iron Co., Sharpsville, Pa.
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The Brier Hill Coal & Iron Co., Youngstown, O.
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Jenkins Bros., New York City.
Pipe Cutting and Threading Machines—
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Bickford Drill & Tool Co., Cincinnati, O.
Planer Chucks—
Massey Vise Co., Chicago, Ill.
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Enterprise Boiler Co., Youngstown, O.
Plumbago—
The S. Obermayer Co., Cincinnati, O.
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C. H. Besly & Co., Chicago, Ill.
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Clayton Air Compressor Works, New York.
Pneumatic Tools—
American Pneumatic Tool Co., New York City
Q & C Co., Chicago. Ill.
Portable Forge—
C. H. Besly & Co., Chicago, Ill.
B. F. Sturtevant Co., Boston, Mass.
Vulcan Mfg. Co., Pittsburg, Pa.
Power Drop Hammers—
Baush & Harris Machine Tool Co., Springfield Mass.
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Bertsch & Co., Cambridge City, Ind.
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R. Konigslow & Bro. Cleveland, O.
Power Transmission Machinery—
Jeffrey Mfg. Co., Columbus, O.
The Lane & Bodley Co., Cincinnati, O.
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Bertsch & Co., Cambridge City, Ind.
C. H. Besly & Co., Chicago. Ill.
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W. A. Jones Foundry Co., Chicago, Ill.
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Blakeslee Mfg. Co., Du Quoin, Ill.
Fred M. Prescott Steam Pump Co., Milwaukee Wis.
Hall Steam Pump Co., Pittsburg, Pa.

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R. Konigslow & Bro. Cleveland, O.

Pyrometers—
Edward Brown, Philadelphia, Pa.
Vulcan Mfg. Co., Pittsburg, Pa.

Railway Supplies—
Cleveland City Forge & Iron Co., Cleveland, O.

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Champion Rivet Co., Cleveland, O.
Jones & Laughlins, Ltd., Pittsburg, Pa.

Riveted Steel Pipe—
The Wm. B. Pollock Co. Youngstown, O.

Rock Drills—
Rand Drill Co., Chicago, Ill.
The Ingersoll-Sergeant Drill Co., New York.

Rolling Mill Machinery.
Totten & Hogg Iron and Steel Foundry Co., Pittsburg, Pa.

Roofs—
Shiffler Bridge Co., Pittsburg.
Riter-Conley Mfg. Co., Pittsburg, Pa.

Sand and Chill Rolls—
Seaman, Sleeth Co., Pittsburg, Pa.

Saws—
Peter Gerlach & Co., Cleveland, O.

Screens for Coal Ore, Etc.
Robt. Aitchison Perforated Metal Co., Chicago.
Harrington & King Perforating Co., Chicago.
Jeffrey Mfg. Co., Columbus, O.
The Aultman Co., Canton, O.

Screws—
C. H. Besly & Co., Chicago, Ill.
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Chicago Screw Co., Chicago, Ill
Rockford Bolt Works, Rockford, Ill.

Shafting—
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Fitzsimmons & Co., Cleveland, O.
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Shapers—
Baush & Harris Machine Tool Co., Springfield, Mass.

Shearing and Punching Machinery—
Bertsch & Co., Cambridge City, Ind.
Fox Machine Co., Grand Rapids, Mich.

Sheet Iron—
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R. Konigslow & Bro. Cleveland, O.

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The Wm. B. Pollock Co., Youngstown, O.

Steam Boiler Inspectors—
Hartford Steam Boiler Inspection & Insurance Co., Hartford, Conn.

Steam Pipe and Boiler Covering—
C. H. Besly & Co., Chicago Ill.

Steam Packing—
C. H. Besly & Co., Chicago, Ill.

Steam Pumps—
Hall Steam Pump Co., Pittsburg, Pa.
Stilwell-Bierce & Smith-Vail Co., Dayton, O.
Blakeslee Mfg. Co., Du Quoin, Ill.

Steam Shovels and Dredges—
Marion Steam Shovel Co., Marion, O.
The Bucyrus Co., South Milwaukee, Wis.

Steam Specialties—
C. H. Besly & Co., Chicago, Ill.

Steel—
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E. H. Stroud & Co., Chicago, Ill.
Bræburn Steel Co., Bræburn, Pa.
Crescent Steel Co., Pittsburg, Pa.
La Belle Steel Co., Pittsburg, Pa.
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Sanderson Bros. Steel Co., Cleveland, O.
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Steel Castings—
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Steel Blooms and Billets—
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Steel Stamps and Stencils—
J. H. Fleharty & Co., Cleveland, O.

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Hanson McDowell, Chicago, Ill.

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Enterprise Boiler Co., Youngstown, O.
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The Wm. B. Pollock Co., Youngstown, O.
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The Ironsides Company, Columbus, O.

Wire Filler.
The Ironsides Company, Columbus, O.

Wire Machinery—
The F. B. Shuster Co., New Haven, Conn.
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A. H. Nilson Machine Co., Bridgeport, Conn.

Wire Nails—
Cleveland Rolling Mill Co., Cleveland, O.

Wire Rope Coating.
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MANUFACTURERS OF
FINE TOOL STEEL AND FORGINGS. ALSO SPRING HAMMER, AND MACHINERY STEEL OF HIGH QUALITY. FINE OPEN-HEARTH STEEL.

DIRECTORS: Wm. Metcalf, Chas. Metcalf, P. B. Hasbrouck, R. P. Kelly, Sec'y. and Treas.

MORE WEAR from your tools
.....Almost no **STEEL EXPENSE**
NO TROUBLE
"It pays to use the most reliable tool steel in the market."
SANDERSON BROS. STEEL CO.
Cleveland Warehouse, 97 Water St.

ESTABLISHED 1865 ✠ INCORPORATED 1888.
CRESCENT STEEL
CRESCENT STEEL CO.
480 PEARL ST. NEW YORK — PITTSBURGH, PA. — 64 & 66 S. CLINTON ST. CHICAGO.

La BELLE STEEL CO., Pittsburgh, Pa.
MANUFACTURERS OF FINE
CRUCIBLE CAST TOOL STEEL.
SPECIAL GRADES FOR ALL PURPOSES.
BYRON H. WHITE,
Western Selling Agent.
OFFICE AND WAREHOUSE: **68 and 70 South Canal St., Chicago.**

BYRON H. WHITE, Western Selling Agent,
68-70 South Canal St., Chicago.

THE MORRIS & BAILEY STEEL CO.
COLD ROLLED STRIP STEEL
FLAT & COILED FOR STAMPING BLANKING DRAWING SPRINGS ETC
PITTSBURG, PA
BYRON H WHITE
WESTERN SELLING AGENT
BYRON H. WHITE, Western Selling Agent, CHICAGO.

Don't Waste Money in Your Pattern Shop.
THE GOBEILLE PATTERN CO., Cleveland.

OUR NEW
University Bicycle Saddle
WILL SOON BE READY.
LOOK FOR IT.
Parkhurst & Wilkinson Co.,
146-164 Kinzie Street, CHICAGO.

Between the Lakes and the Gulf, the Mississippi and the Allegheny Mountains—the best buying section of the United States—is the BULK of THE IRON TRADE REVIEW'S circulation. In this section advertisers in all trade papers get best returns.

Metallurgy of Cast Iron, Price $3.00.

IRON AND STEEL MARKETS.

IRON ORE.
[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	$3.75
No. 1 Specular, Bessemer	$3.15@ 3.50
No. 1 Bessemer hematite	2.75@ 3.25
Hematites No. 1 non-Bessemer	1.90@ 2.10
No 1. Specular, non-Bessemer	2.00@ 2.40
Mesabi Bessemer	1.80@ 2.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$15 15
No. 1 Strong Foundry	$15 50@16 00
No. 2 Strong Foundry	15 00@15 50
Gray Forge, red short	14 65
Gray Forge, neutral	14 40
No. 1 American Scotch	15 90@16 15
No. 2 American Scotch	15 40@15 65
Lake Superior Charcoal	15 00@16 00
PITTSBURG:	
No. 1 Foundry	$15 50@ 16 00
No. 2 Foundry	15 00@ 16 00
Gray Forge	14 25@ 14 50
White and Mottled	13 50
Warm Blast Charcoal	15 00@ 17 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	15 00@ 15 25
CHICAGO:	
Lake Superior Charcoal	$17 00@$18 00
Local Coke Foundry No. 1	15 50@ 15 75
Local Coke Foundry No. 2	15 00@ 15 50
Local Coke Foundry No. 3	14 50@ 14 75
Local Scotch Foundry No. 1	15 50@ 15 75
Local Scotch Foundry No. 2	15 00@ 15 50
Local Scotch Foundry No. 3	14 50@ 14 75
Southern Coke No. 1	16 00@ 16 25
Southern Coke No. 2	15 25@ 15 75
Southern Coke No. 3	14 75@ 15 00
Southern No. 1 Soft	15 50@ 16 00
Southern No. 2 Soft	15 00@ 15 50
Southern Silveries	15 50@ 16 00
Jackson Co. Silveries	17 00@ 18 00
Ohio Silveries No. 1	
Ohio Strong Softeners	15 50@ 16 50
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	15 50@ 16 00
Coke Bessemer	15 50@ 16 00
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$14 75@ 15 25
Southern Coke No. 2 and No. 1 Soft	14 75@ 14 75
Hanging Rock Charcoal No. 1, Fdy	17 00@ 18 00
Tennessee Charcoal No 1	15 00@ 16 00
Jackson County Silvery No 1	16 00@ 16 25
Southern Coke, Gray Forge	12 75@ 13 00
" " Mottled	12 75@ 13 00
Standard Georgia Car Wheel	15 50@ 16 00
Lake Superior " "	15 50@ 16 00
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$14 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	13 75
Ohio Strong Softener No. 1	14 00
Ohio Strong Softener No. 2	13 50
Jackson Co. Silvery No. 1	15 60
Southern Soft No. 1	15 25
Southern Soft No. 2	14 75
Lake Superior Charcoal	14 00@ 14 50
Coke, Malleable	14 10
ST. LOUIS:	
Southern Coke No 1	$14 75
Southern Coke No. 2	14 25
Southern Coke No. 3	13 75
Southern Coke No. 4	13 55
Southern Gray Forge	13 20
Tennessee Charcoal No. 1	13 75
Jackson County 8 per cent Silicon	16 25
Lake Superior Coke No. 1	15 00@ 16 00
Southern Car Wheel	15 25@ 16 25
Genuine Connellsville Coke	4 15
West Virginia Coke	4 10

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	Gross Tons
Old iron rails	$18 00
Old steel rails (6 ft. and over)	14 00
Old steel rails (6 ft. and under)	14 00
Old car wheels	16 00
	Net Tons
No. 1 R. R. wrought scrap	$16 50
Mill scrap	11 50
No. 1 Machine cast scrap	12 50
Iron axles	19 00
Axle turnings	11 00
Wrought turnings (free from cast)	10 00
Cast borings	7 50
Uncut wrought iron boilers	7 00
Steel boiler plates	11 00
Grate bars	8 00
Pipes and flues (clean)	10 00
Tank iron	12 00
Hoop and band iron	9 00
Sheet iron	8 00
Wrought drillings	10 00
Malleable iron	10 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1.50c
Angles	1.50c
Tees	1.50c
Universal Plates	1.80@1.90c
Sheared Plates	2.00c

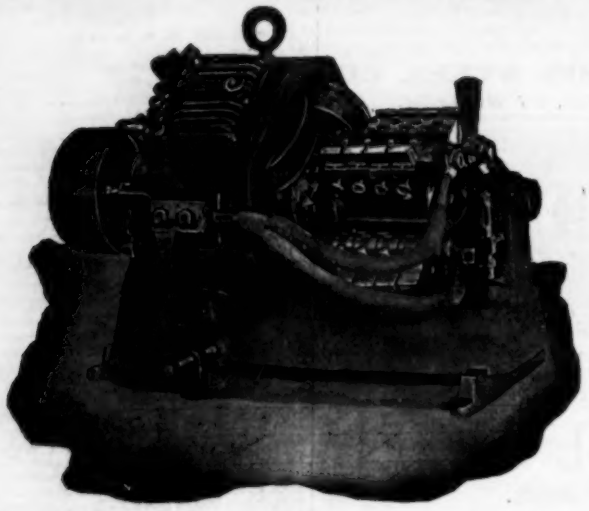
MERCHANT IRON AND STEEL.
[Less than car-lots, Cleveland.]
Rounds and Squares.—Bar Iron.

1 to 1½	1.50 Base.
2 to 2½	.20 extra.
3 to 3½	.50 "
3½ to 4	.50 "
4½ to 4½	1.00 "
4½ to 5	1.50 "
5½ to 6	1.0.80 "
5½ to 6½	22 "

Eddy Dynamo Electro-Plating Machines

— FOR —

BICYCLE PLATING PLANTS.



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EXCLUSIVE WESTERN SELLING AGENTS.

Water Softening Plants

Are the best and cheapest Purifiers for Steam Boilers. Cost of softening less than Boiler Compound.

THE WEFUGO COMPANY,

Smith and Augusta Sts. CINCINNATI, O.

THE IRON TRADE REVIEW

Is an increasingly valuable medium through which to sell equipment to machine shops and foundries.

Subscribe for The IRON TRADE REVIEW, $3 per year.

Hints on Amalgamation

AND THE

General Care of Gold Mills.

By W. J. ADAMS.

ILLUSTRATED.

A Practical Book for Practical Men.

Should be in the hands of every mining man and metallurgist.

All previous works on gold metallurgy have devoted most attention to the theories mechanics, chemistry and history of gold milling. This book tells

WHAT TO DO AND HOW TO DO IT.

It is not based on laboratory tests, but on the PRACTICAL RESULTS obtained by the author in an experience of over twenty years, and tells how best to employ that which is already for use, not in any one locality, but all over the world.

The articles, from which this book is compiled, first appeared in our columns, where they secured widespread interest. We have undertaken its publication at the suggestion of prominent men in the mining world, who wished to have the valuable information therein contained in more permanent form.

CLOTH BOUND, $1.50.

Modern Machinery Publishing Co.

218 La Salle Street,

CHICAGO, U.S.A.

6⅝ to 7⅛	2.50 extra
¾ to ⅞	.10 "
⅜ to 11-16	.20 "
½ to 9-16	.30 "
7-16 to 15-32	.30 "
⅜ to 13 2	.40 "
5-16 to 1 32	.50 "
¼ to 9-32	.70 "
7-32	.90 "
3-16	1.40 "
	2.50 "

Flats.—Bar Iron.

1¼ to 4 x ⅜ to 1	1.03 Base
4¼ o 6 x ⅜ to 1	.10 extra
6¼ o 8 x ⅜ to 1	.60 "
8¼ o 10 x ⅜ to 1	.80 "
1⅜ o 4 x 1 1-16 to 1½	.30 "
4¼ to 6 x 1 1-16 to 1½	.40 "
6¼ to 8 x 1 1-16 to 1½	.60 "
8¼ to 10 x 1 1-16 to 1½	.90 "
2 to 4 x 1⅝ to 2	.50 "
4¼ to 6 x 1⅝ to 2	.60 "
6¼ to 8 x 1⅝ to 2	.80 "
8¼ to 10 x 1⅝ to 2	1.00 "
2 to 4 x 2⅛ to 3	.60 "
4¼ to 6 x 2⅛ to 3	.80 "
6¼ to 8 x 2⅛ to 3	1.00 "
1⅜ to 1⅜ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅝	.20 "
¼ to 15-16 x ⅜ to ⅝	.40 "
⅝ to 11-16 x ⅜ to ⅝	.50 "
⅛ to 9-16 x ⅜ to ⅝	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6¼ to 6¾ x ¼ to 5-16	.50 "
4¼ to 6 x ¼ to 5-16	.30 "
1⅜ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30 "
¼ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
½ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. Bevel Edge Shaft Iron 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6¼ to 6¾ x No. 9 to 3-16	.70 "
6¼ to 6¾ x Nos. 10, 11 and 12	.80 "
4¼ to 6 x No. 9 to 3-16	.50 "
4¼ to 6 x Nos. 10, 11 and 12	.60 "
1¼ to 4 x No. 9 to 3-16	.40 "
1¼ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40
⅜ x No. 9 to 3-16	1.50
⅜ x Nos. 10, 11 and 12	1.60

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¾ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes o Light Bands.

Oval Iron.

⅜ to 1⅜	.40 extra
¾ to 13-16	.50 "
⅝ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅞ to 2	.50 "
¾ to 13-16	.70 "
⅝ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	3.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

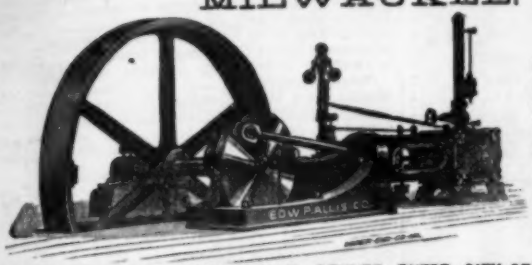
Steel Bands.

Width In Inches.	English Standard Gauge.		
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16 "	1.50	Base.
			Extras.
1¼ to 6,	" 10, 11, 12 or 1/4"	.05	per 100 lbs.
1 to 1⅜,	" 7, 8, 9 or 3-16"	.10	"
1 to 1⅜,	" 10, 11, 12 or 1/4"	.15	"
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20	"
13-16 and ⅞,	" 10, 11, 12 or 1/4"	.25	"
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30	"
11-16 and ¾,	" 10, 11, 12 or 1/4"	.35	"
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40	"
9-16 and ⅝,	" 10, 11, 12 or 1/4"	.45	"
½,	Nos. 7, 8, 9 or 3-16"	.55	"
½,	" 10, 11, 12 or 1/4"	.60	"
7-16	" 7, 8, 9 or 3-16"	.75	"
7-19	" 10, 11, 12 or 1/4"	.85	"
⅜,	" 7, 8, 9 or 3-16"	.95	"
⅜,	" 10, 11, 12 or 1/4"	1.05	

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.		
7-16 to 3	Nos. 13, 14, 15 and 16	1.60	Base
			Extras.
7-16 to 2,	" 17, 18, and 19	.05	per 100 lb
7-16 to 2,	" 20	.10	"
7-16 to 2,	" 21	.15	"
7-16 to 1¼,	" 22	.25	"
½ to 1¼,	" 13, 14 and 15	.05	"
½ to 1¼,	" 16, 17 and 18	.10	"

THE EDWARD P. ALLIS COMPANY
MILWAUKEE, WIS.



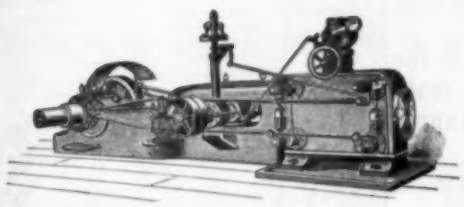
MANUFACTURERS OF

Blowing Engines, Hoisting Engines, Pumping Engines Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills Concentrators, General Mining Milling and Smelting Machinery.

Reynolds Corliss Engines.

NEW YORK. CHICAGO. MINNEAPOLIS. DENVER. BUTTE. CITY OF MEXICO. SAN FRANCISCO. PITTSBURG.

THE LANE & BODLEY CO.,
CINCINNATI, OHIO.



Engines,

ALL SIZES.

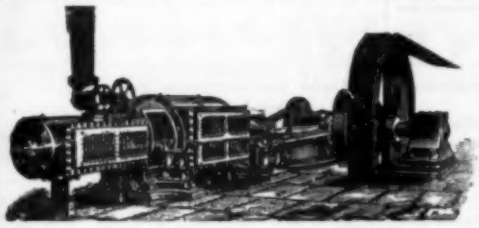
Simple and Compound.

Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

WILLIAM TOD & CO.
YOUNGSTOWN, OHIO.

The Porter-Hamilton Engine



Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

Park Building, Pittsburg.

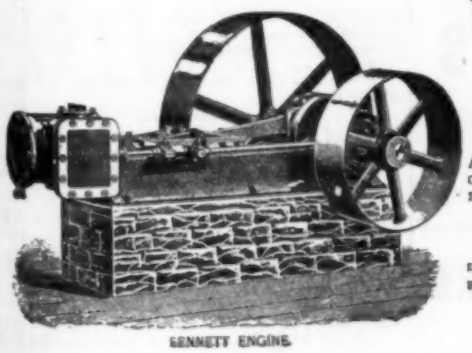
SEWARD S. BABBITT.

Who builds the best Mine Pump?

PRESCOTT.

Fred. M. Prescott Steam Pump Co.,

MILWAUKEE, WIS.



SENNETT ENGINE.

THE GEO. B. SENNETT CO.,
YOUNGSTOWN, OHIO,

MANUFACTURERS OF THE

Sennett Slide Valve Engine.

A well made and durable center crank engine of from 20 to 40 h. p. The design is thoroughly modern and all parts are made in duplicate. Engines kept in stock ready to run. Catalogues or prices willingly furnished. Among our other specialties are the

Sennett Compressed Couplings.

(See advertisement next week.)

Foundry contracts solicited for Castings from 10 lbs. to 5 tons each.

1⅛ to 1⅜,	"	19 and 20	Per 100 lbs.
1⅛ to 1⅜,	"	21	.30 "
1⅛ to 1⅜,	"	22	.30 "
15-16 and 1,	"	13, 14 and 15	"
15-16 and 1,	"	16, 17 and 18	.15 "
15-16 and 1,	"	19 and 20	.20 "
15-16 and 1,	"	21	.25 "
15-16 and 1,	"	22	.35 "
⅛, Nos.		13, 14 and 15	.30 "
⅛, "		16, 17 and 18	.35 "
⅛, "		19 and 20	.30 "
⅛, "		21	.35 "
⅛, "		22	.45 "
⅛ and 13-16	Nos.	13, 14 and 15	.30 "
⅛ and 13-16	"	16, 17 and 18	.35 "
⅛ and 13-16	"	19 and 20	.40 "
⅛ and 13-16	"	21	.45 "
⅛ and 13-16	"	22	.50 "
⅛ and 13-16	"	23	.60 "
11-16, Nos.		13, 14 and 15	.35 "
11-16, "		16, 17 and 18	.40 "
11-16, "		19 and 20	.50 "
11-16, "		21	.60 "
11-16, "		22	.70 "
11-16, "		23	.80 "
⅝, Nos.		13, 14 and 15	.40 "
⅝, "		16, 17 and 18	.45 "
⅝, "		19 and 20	.55 "
⅝, "		21	.65 "
⅝, "		22	.75 "
⅝, "		23	.85 "
9-16, "		13, 14 and 15	.45 "
9-16, "		16, 17 and 18	.50 "
9-16, "		19 and 20	.60 "
9-16, "		21	.70 "
9-16, "		22	.80 "
9-16, "		23	.90 "
⅝, "		13, 14 and 15	.55 "
⅝, "		16, 17 and 18	.60 "
⅝, "		19 and 20	.70 "
⅝, "		21	.80 "
⅝, "		22	.90 "
⅝, "		23	1.00 "
7-16, "		13, 14 and 15	.80 "
7-16, "		16, 17 and 18	.90 "
7-16, "		19 and 20	1.00 "
⅜, "		13, 14 and 15	1.00 "
⅜, "		16, 17 and 18	1.10 "
⅜, "		19 and 20	1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

Flats.	cts. lbs.
2 to 9-16 in. wide by 2 to ½ thick	.08

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 40
Open-hearth Tire	"	1 45
Open-hearth Spring	"	1 80
Sleigh Shoe	"	1 45
Toe Calk	"	1 90
Cutter Shoes, tapered and bent	"	1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	.08
9-16 to ⅞ in. "	.08
7-16 to ⅜ and 2⅛ to 3 in.	.09
3⅛ to 4 in.	.09½
⅛ to 11-16 and 4⅛	.10
⅛ to 6 in.	.10½
¼ to 9-32 and 6⅛ to 7 in	.11
1 in.	.13

Burden Boiler Rivets.

⅛, ⅜, 11-16 and ⅝ inches diameter	3 00
Bridge ⅛, ⅜, 11-16 and ⅝ inch diam.	2 35

Wrought Pipe and Boiler Tubes.

Lap weld black, base, and 10 per cent				.70
Butt "	"	"	"	.72
Lap "	galv.	"	"	.70
Butt "	"	"	"	.67
Boiler tubes 2¼" and smaller				72½
Boiler tubes 2½" and larger				.72
Casing screw and socket joint				dis. 50
Casing inserted joint				dis. 45

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anti-Friction Metals.

Magnolia Anti-Friction Metal, 25 cts. per lb., f. o. b. New York or Chicago.
No Name Metal, 15 cts. per lb., f. o. b. New York or Chicago.
Mystic Metal. 10 cts. per lb., f. o. b. New York or Chicago.

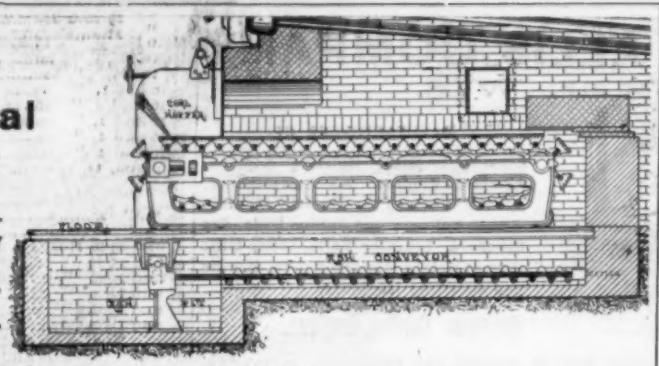
Anvils.

American	₩ lb 09½
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's dis; Bullock's dis 50 & 1
Moulders'	dis 40 & 10
Hand	dis 60 & 10

The Playford Mechanical Stoker



Guaranteed to

Abolish smoke, to increase boiler capacity and to save fuel.

For information, address,

The Playford Stoker Co.

404 Telephone Bldg.,

CLEVELAND, OHIO.

IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.

CLEVELAND, OHIO.

Trade Mark Patented.

ORDER DIRECT FROM THE

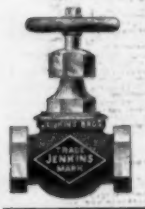
Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.



We Claim The Following Merits for Jenkins Bros.' Valves

1. Manufactured of the best Steam Metal.
2. No regrinding, therefore not constantly wearing out the Seat of the Valves.
3. Contain JENKINS DISC, which is suitable for all Pressures of Steam, Oil and Acids.
4. The Easiest Repaired, and all parts Interchangeable.
5. Every Valve Tested before leaving the factory.
6. ALL GENUINE stamped with Trade Mark, (2)

JENKINS BROTHERS, NEW YORK, PHILADELPHIA, CHICAGO, BOSTON.

DIXON'S SILICA GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. IT IS ABSOLUTELY WITHOUT AN EQUAL. Tin roofs well painted have not required repainting for 10 to 15 years.

If you need any paint it will pay you to send for circular.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

FOR GREAT TENSILE STRENGTH, ELASTICITY AND ELONGATION, COUPLED WITH UNUSUAL NON-CORROSIVE QUALITIES,

Castings and Propeller Wheels

MADE FROM

PARSONS MANGANESE BRONZE

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" Independent Lathe	dis 40&10
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Cleveland	dis 10@1
Pratt & Whitney	dis 10@1
Standard	dis 10@1
Morse	dis 10 to 1
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" " Gear Cutters	dis 1

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Cast Steel	₱ 3¼
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Morse Taper & Straight Shank to 1¼"	dis 50&10 to 60
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Drill Sockets	dis 25
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Cleveland " "	dis 60@60&5

Emery.

	No. 4 to No. 54 46 gr.	No. 4 to No. 54 150 gr.	Flour, C. F
Kegs, ₱ ℔	4½c	5 c	2½c
½ kegs ₱ ℔	4½c	5½c	2½c
¼ kegs ₱ ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	c
10 ℔ cans less than 10	10 c	10 c	½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
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Detroit	dis 60@70
Norton's	dis 60@70
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Celluloid	dis 10&33⅓
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Crystal	dis 65@70
Vitrified	dis 60@70
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Hamden	dis 60&10@70
Cyclone	dis 60@60&10

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Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 2
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 55
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	10c
" " " " over 5 lbs	8c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5¾	4¾	4	3⅜	3⅛
Hexagon	15¼	11¼	8¼	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₱ ℔ add ½c., 1 ℔ boxes add 1c to list.

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{ Less than car lots	$1.4

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Brass and Copper	dis 50
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Valley Jctn. & Way Stations.	*6:25 P M	*7:25 A M
Marietta, Wheeling & Chicago	†9:25 P M	†7:25 A M
Cleveland Press Special	†9:25 P M	†2:00 P M
Akron, Canton & Wheeling	*10:20 A M	*3:30 P M
Akron, Canton & Chicago	*8:05 A M	*6:35 P M
Akron, Canton & Marietta,	†2:10 P M	†11:00 A M
Pittsburg, Washington, D. C., & Baltimore	*11:30 A M	†2:00 P M
Akron Theatre Train		†11:10 P M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule sleeping cars between Cleveland and Chicago, also Cleveland and Baltimore.

Cleveland, Lorain & Wheeling

Railroad Company.

Time Table effective May 15th, 1898.
Cleveland Depot: Foot of South Water Street.
Elyria Depot: Huron St., West Side.

South Bound.			Central Standard. Lorain Branch	North Bound.		
15	13	11	LV. AR.	12	14	16
P.M.	P.M.	A.M.	Lorain	A.M.	A.M.	P.M.
4:25	2:25	6:27		9:15	11:35	7:30
4:40	2:30	6:44	Elyria	9:00	11:21	7:16
4:56	2:55	7:04	Grafton	8:43	11:07	6 58
5:15	3:12	7:23	Lester	8:25	10:50	6:40
3	3	1	Main Line	2	4	6
5:30	2:25	7:20	Cleveland	8:30	11:50	7:15
5:47	2:41	7:36	Brooklyn	8:14	11:34	7:01
6:42	3:26	8:22	Lester	7:29	10:49	6:19
6:52	3:35	8:30	Medina	7:16	10:37	6:07
7:05	3:46	8:41	Chippewa La	7:04	10:26	5:55
7:20	4:01	8:56	Sterling	6:48	10:12	5:40
8:09	4:46	9:45	Massillon	6:00	9:23	4:54
8:55	5:31	10:34	Canal Dover.	5:11	8:36	4:10
9:02	5:38	10:41	New Philade	5:04	8:28	4:03
9:20	6:05	11:25	Uhrichsville	4:45	8:10	3:45
.....	8:10	1:30	Bridgeport	.....	6:05	1:40
.....	8:25	.....	Bellaire	.....	5:50	.....
P.M.	P.M.	P.M.	AR. LV.	A.M.	A.M.	P.M.

No. 9 leaves Lorain 9:50 a.m., Elyria 10:05, Grafton 10:21; arrives Lester Junction 10:40. No. 10 leaves Lester Junction 3:25 p.m., Grafton 3:42, Elyria 3:57; arrive Lorain at 4:10 p.m.

Trains 1, 2, 5 and 6 daily between Cleveland and Urichsville. All other trains daily except Sundays. Electric cars between Bridgeport and Wheeling, and Bridgeport and Martins Ferry and Bellaire. Consult agents for general information as to the best routes and passenger rates to all points.

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Crucible Steel Works,
Plate and Sheet Mills,
Rail Mills,
Structural Mills,
Steel Casting Works,
Cut-Nail Works,
Tin Plate Works,
Stamping Works,
Forges and Bloomaries,
Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
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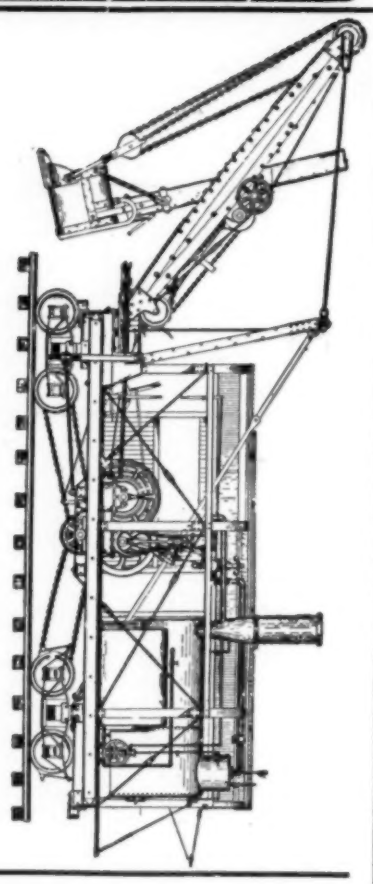

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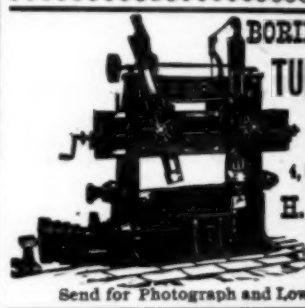

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